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MANUAL REVISION TRANSMITTAL
Manual 172 (61-10-72)
-2 Series Steel "A" Hub
Propeller Overhaul Manual

Revision 5 dated June 2023

Remove Pages:	**Insert Pages**:
ENTIRE MANUAL	**ENTIRE MANUAL**

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

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

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Manual No. 172
61-10-72
Revision 5
June 2023

-2 SERIES STEEL "A" HUB PROPELLER OVERHAUL MANUAL

Two Blade	Three Blade	
HC-A2VF-2	HC-A3VF-2	HC-A3MVF-2
HC-A2VF-2A	HC-A3VF-2A	HC-A3MVF-2A
HC-A2VF-2B	HC-A3VF-2B	HC-A3MVF-2B
HC-A2VK-2	EHC-A3VF-2B	EHC-A3MVF-2B
HC-A2VL-2	PHC-A3VF-2B	PHC-A3MVF-2B
HC-A2V20-2	PHC-A3VF-2C	PHC-A3MVF-2C
HC-A2MVF-2	HC-A3VF-2D	HC-A3MVF-2D
HC-A2MVF-2A	PHC-A3VF-2D	PHC-A3MVF-2D
HC-A2MVF-2B	HC-A3VK-2	HC-A3MVK-2
HC-A2MVK-2	HC-A3VK-2A	HC-A3MVK-2A
HC-A2MVL-2	HC-A3VK-2B	HC-A3MVK-2B
HC-A2MV20-2	HC-A3VK-2BL	HC-A3MVK-2BL
HC-A2MV20-2A	HC-A3VK-2C	HC-A3MVK-2C
	HC-A3V20-2	HC-A3MV20-2
	HC-A3V20-2L	HC-A3MV20-2L

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REVISION 5 HIGHLIGHTS

Revision 5, dated June 2023, incorporates the following:

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

Updated the Hartzell Propeller Inc. logo on the cover and revised the header on all pages.

Revised the titles of Hartzell Propeller Inc. Aluminum Blade Maintenance Manual 133C and Hartzell Propeller Inc. Composite Propeller Blade Maintenance Manual 135F to Hartzell Propeller Inc. Aluminum Blade Overhaul Manual 133C and Hartzell Propeller Inc. Composite Blade Overhaul Manual 135F where applicable

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

- TESTING AND FAULT ISOLATION
  - Added the section, "Lightning Strike on Hub or Blade"
- CLEANING
  - Revised the section, "Cleaning Procedures"
- ASSEMBLY
  - Revised the section, "Piston Assembly Installation"
- FITS AND CLEARANCES
  - Revised the section, "Blade Tolerances"
  - Removed Table 8-2, "Blade Tolerances"
- ILLUSTRATED PARTS LIST
  - Revised the Parts List for 834-2A: Guide Collar Unit

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REVISION 5 HIGHLIGHTS

1. Introduction

   A. General

      (1) 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 revision.

      (3) Comments indicates the level of the revision.

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

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

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

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

Revision No.	Issue Date	Comments
Original	Jun/04	New Issue
Revision 1	Aug/15	Minor Revision
Revision 2	Sep/21	Major Revision
Revision 3	Apr/22	Minor Revision
Revision 4	Oct/22	Minor Revision
Revision 5	Jun/23	Major Revision

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RECORD OF REVISIONS

This is a record of revisions inserted into this manual.
Revision 5 includes all prior revisions.

Revision Number	Issue Date	Date Inserted	Inserted By
5	Jun/23	Jun/23	HPI

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RECORD OF TEMPORARY REVISIONS

Update this page to show all Temporary Revisions inserted into this manual.
Revision 5 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

RECORD OF TEMPORARY REVISIONS

Update this page to show all Temporary Revisions inserted into this manual.
Revision 5 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

SERVICE DOCUMENT LIST

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

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

Service Document Number	Incorporation Rev./Date

Service Document Number	Incorporation Rev./Date

SERVICE DOCUMENT LIST

Service Document Number	Incorporation Rev./Date	Service Document Number	Incorporation Rev./Date

AIRWORTHINESS LIMITATIONS

1. Airworthiness Limitations

   A. Life Limits

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

      (2) For airworthiness limitations information, refer to Hartzell Propeller Inc. Owner's Manual 168.

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LIST OF EFFECTIVE PAGES

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INTRODUCTION - CONTENTS

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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	Metal Spinner Maintenance Manual
Manual 133C (61-13-33)	-	Aluminum Blade Overhaul Manual
Manual 159 (61-02-59)	Yes	Application Guide
Manual 165A (61-00-65)	Yes	Illustrated Tool and Equipment Manual
Manual 168 (61-00-68)	Yes	Propeller Owner's Manual and Logbook for Steel "A" Hub Reciprocating Propeller Models with Aluminum Blades
Manual 180 (30-61-80)	Yes	Propeller Ice Protection System Manual
Manual 202A (61-01-02)	Vol. 7, Yes Vol 11, Yes	Standard Practices Manual, Volumes 1 through 11

B. Vendor Publications

None.

3. Personnel Requirements (Rev. 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)

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

A. Component Life

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

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

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

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

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

(b) Refer to the Airworthiness Limitations chapter in the applicable Hartzell Propeller 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 possible to prevent degradation of the damage.

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

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

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

Term	Definition
Face	The surface of the blade that is directed toward the rear of the aircraft. The face side is the high pressure, or thrusting, side of the blade. The blade airfoil sections are normally cambered or curved such that the face side of the blade may be flat or even concave in the midblade and tip region.
Face Alignment	Distance from the blade centerline to the highest point on the face side perpendicular to the chord line
Feathering	The capability of blades to be rotated parallel to the relative wind, thus reducing aerodynamic drag
Fraying	A raveling or shredding of material
Fretting	Damage that develops when relative motion of small displacement takes place between contacting parts, wearing away the surface
Galling	To fret or wear away by friction
Gouge	Surface area where material has been removed
Hazardous Propeller Effect	The hazardous propeller effects are defined in Title 14 CFR section 35.15(g)(1)
Horizontal Balance	Balance between the blade tip and the center of the hub
Impact Damage	Damage that occurs when the propeller blade or hub assembly strikes, or is struck by, an object while in flight or on the ground
Inboard	Toward the butt of the blade
Intergranular Corrosion	Corrosion that attacks along the grain boundaries of metal alloys
Jog	A term used to describe movement up/down, left/right, or on/off in short incremental motions
Laminate	To unite composite material by using a bonding material, usually with pressure and heat
Lengthwise	A direction that is generally parallel to the pitch axis
Loose Material	Material that is no longer fixed or fully attached
Low Pitch	The lowest blade angle attainable by the governor for constant speed operation

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

Term	Definition
Pitting (Linear)	The configuration of the majority of pits forming a pattern in the shape of a line
Porosity	An aggregation of microvoids. See “voids”.
Propeller Critical Parts	A part on the propeller whose primary failure can result in a hazardous propeller effect, as determined by the safety analysis required by Title 14 CFR section 35.15
Reference Blade Radius	Refers to the propeller reference blade radius in an assembled propeller, e.g., 30-inch radius. A measurement from the propeller hub centerline to a point on a blade, used for blade angle measurement in an assembled propeller. An adhesive stripe (blade angle reference tape CM160) is usually located at the reference blade radius location. Note: Do not confuse *reference blade radius* with *blade station*; they may not originate at the same point.
Reversing	The capability of rotating blades to a position to generate reverse thrust to slow the aircraft or back up
Scratch	Same as “Nick”
Short Circuit	Connection of low resistance between points on a circuit between which the resistance is normally much greater
Shot Peening	Process where steel shot is impinged on a surface to create compressive surface stress, that provides improved strength and resistance to fatigue
Single Acting	Hydraulically actuated propeller that utilizes a single oil supply for pitch control
Split	Delamination of blade extending to the blade surface, normally found near the trailing edge or tip
Station Line	See "Blade Station"
Synchronizing	Adjusting the RPM of all the propellers of a multi-engine aircraft to the same RPM
Synchrophasing	A form of propeller sychronization in which not only the RPM of the engines (propellers) are held constant, but also the position of the propellers in relation to each other
Ticking	A series of parallel marks or scratches running circumferentially around the diameter of the blade

Term	Definition
Track	In an assembled propeller, a measurement of the location of the blade tip with respect to the plane of rotation, used to verify face alignment and to compare blade tip location with respect to the locations of the other blades in the assembly
Trailing Edge	The aft edge of an airfoil over which the air passes last
Trimline	Factory terminology referring to where the part was trimmed to length
Underspeed	The condition in which the actual engine (propeller) RPM is lower than the RPM selected by the pilot through the propeller control/condition lever
Unidirectional Material	A composite material in which the fibers are substantially oriented in the same direction
Variable Force	A force that may be applied or removed during propeller operation
Vertical Balance	Balance between the leading and trailing edges of a two-blade propeller with the blades positioned vertically
Voids	Air or gas that has been trapped and cured into a laminate
Windmilling	The rotation of an aircraft propeller caused by air flowing through it while the engine is not producing power
Woven Fabric	A material constructed by interlacing fiber to form a fabric pattern
Wrinkle (aluminum blade)	A wavy appearance caused by high and low material displacement
Wrinkle (composite blade)	Overlap or fold within the material

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

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

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DESCRIPTION AND OPERATION - CONTENTS

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1. General (Rev. 2)

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 Blade Overhaul 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. Shank Conversion

A. Conversion From "V" Shank to "MV" Shank

(1) "V" shank models, which have double-shoulder configuration, have additional repetitve inspections required by Airworthiness Directive 97-18-02.

(2) "MV" shank models, which have a single-shoulder configuration, are not affected by Airworthiness Directive 97-18-02.

(3) "V" shank blades can be converted to "MV" shank to avoid the inspections required by Airworthiness Directive 97-18-02.

(a) After conversion, the propeller model number changes to reflect the conversion. For example, HC-A2V20-1/V8433N becomes HC-A2MV20-1/MV8433N.

(4) Airworthiness Directive 97-18-02 does not apply to ( )HC-A( )MV( )-( ) propellers. These propellers are equipped with "MV" blade shank retention systems.

3. Operation

A. -2 Series Steel "A" Hub Propellers

(1) The propellers described in this section are constant speed assemblies that use a steel hub as the central component.

(2) Propeller blades and bearing assemblies are assembled on the hub arms and are held in place by two-piece steel clamps.

(3) A steel cylinder is threaded onto the steel hub and an aluminum piston is placed over the cylinder.

(4) Link arms connect the piston to the steel clamps to control blade angle.

(5) Depending on the model of the propeller, steel hub assemblies may use counterweights or a spring, or both.

B. Constant Speed Feathering Operation

(1) Constant speed feathering assemblies use oil pressure to decrease the blade angle. A combination of counterweights and the feathering spring are used to increase the blade angle.

(2) Feathering occurs by connecting the propeller oil to drain (engine sump). When the governor feathering mechanism is activated, oil is ported from the propeller to the drain. The combined force of the counterweights and feathering spring moves the blades to the feather position.

(3) The time required to feather the propeller depends on the size of the oil passage from the propeller to the engine, and the force exerted by the spring and counterweights. Feathering normally occurs within ten seconds.

(4) The propeller moves from feather position when the governor control is repositioned to normal flight range. The engine is restarted and after several revolutions, the governor increases oil pressure and moves the blades out of the feather position.

TESTING AND FAULT ISOLATION - CONTENTS

LIST OF FIGURES

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1. Troubleshooting Guide

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

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

Problem	Probable Cause	Remedy
A. Propeller Actuates Slowly or Fails to Actuate	Air is trapped in the propeller piston or in the engine shaft.	Before each flight, cycle the propeller three times to purge trapped air from the propeller.
	Lack of blade bearing lubrication.	Add approved grease to blade clamp lubrication fittings in accordance with the Propeller Lubrication chapter of Hartzell Propeller Inc. Standard Practices 202A (61-01-02).
	Insufficient clearance between various moving parts in the pitch change mechanism.	Examine moving parts individually for interference and establish the correct clearances in accordance with this manual. Isolate the friction in each blade by disconnecting the link arm from the piston and rotating each blade individually before disassembling the propeller.

Problem	Probable Cause	Remedy
A. Propeller Actuates Slowly or Fails to Actuate, continued	Excessive friction in the piston due to the phenolic bushing scraping against the wall of cylinder.	Inspect the inside diameter of the phenolic bushing. Refer to the Check chapter of this manual. Inspect the roundness of the bushing. Refer to the Check chapter of this manual. If necessary, follow the replacement procedure in the Special Adhesive and Bonding Procedures chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). Inspect the outside diameter of the cylinder. Refer to the Check chapter of this manual. Replace the cylinder if necessary. For cylinder repair and rechroming procedures, refer to the Hard Chromium Replating chapter of Hartzell Standard Practices Manual 202A (61-01-02).
	Bearing balls in the split bearing are unusually rough, corroded, or chipped.	Replace the split bearing assembly in accordance with the Assembly chapter of this manual.
	The wire retention ring is wedged under the inboard race of the blade bearing.	Replace the wire retention ring in accordance with the Assembly chapter of this manual.
	The pilot tube has slipped out slightly and is rubbing hard against the end of the cavity in the blade.	Inspect each pilot tube for wear and to ensure that the pilot tube extends the correct distance from the hub arm in accordance with Steel Hub Overhaul chapter of Hartzell Propeller Inc. Standard Practices 202A (61-01-02).
	The feathering spring is weak or broken.	Replace the feathering spring in accordance with the Assembly chapter of this manual.
	Oil passages are blocked.	Inspect the hydraulic system to ensure that the oil passages are clear.

Problem	Probable Cause	Remedy
B. Failure to Feather	Excessive friction in moving parts.	Refer to section A, "Propeller Actuates Slowly or Fails to Actuate".
	The feathering spring is weak or broken.	Replace the feathering spring in accordance with the Assembly chapter of this manual.
C. Surging RPM or Torque	Air is trapped in the propeller piston or in the engine shaft.	The engine should have provision for permitting trapped air to escape from the system during one-half of the pitch cycle. Before each flight, cycle the propeller three times to purge trapped air from the propeller.
	Excessive friction in moving parts.	Refer to section A, "Propeller Actuates Slowly or Fails to Actuate".
D. Oil Leakage	Defective propeller mounting O-ring.	Replace the O-ring in accordance with the Assembly chapter of this manual.
	Felt seal is displaced.	Replace the felt seal in accordance with the Assembly chapter of this manual.
	Defective O-ring seal between the hub and cylinder.	Replace the O-ring in accordance with the Assembly chapter of this manual. Replace the cylinder if its surface is scratched or gouged in the area where the O-ring slides.
	Faulty O-ring on pitch change rod.	Replace the O-ring in accordance with the Assembly chapter of this manual.
	Defective O-ring seal between the hub and cylinder.	Replace the O-ring in accordance with the Assembly chapter of this manual.

Problem	Probable Cause	Remedy
E. Grease Leakage	Damaged lubrication fitting cap.	Replace the lubrication fitting cap.
NOTE: The clamp/ split-bearing is the only source for grease leakage.	Loose lubrication fitting.	Secure the fitting in accordance with the Assembly chapter of this manual.
	Defective lubrication fitting.	Replace the defective lubrication fittings.
	Grease leaks past blade clamp seal gaskets.	Loosen the blade clamp bolts and replace the gaskets, sealant, and gasket compound.
	Grease leaks from between blade and clamp.	Remove the blade and the clamp. Add approved gasket compound CM46 in the radius of the blade. Reassemble the blade and clamp in accordance with the Assembly chapter of this manual.
	No silicone sealant CM93 on the clamp radius of bearing-to-clamp interface.	Remove the blade and the clamp. Add approved sealant CM93 in the radius of the clamp. Reassemble the blade and the clamp in accordance with the Assembly chapter of this manual.

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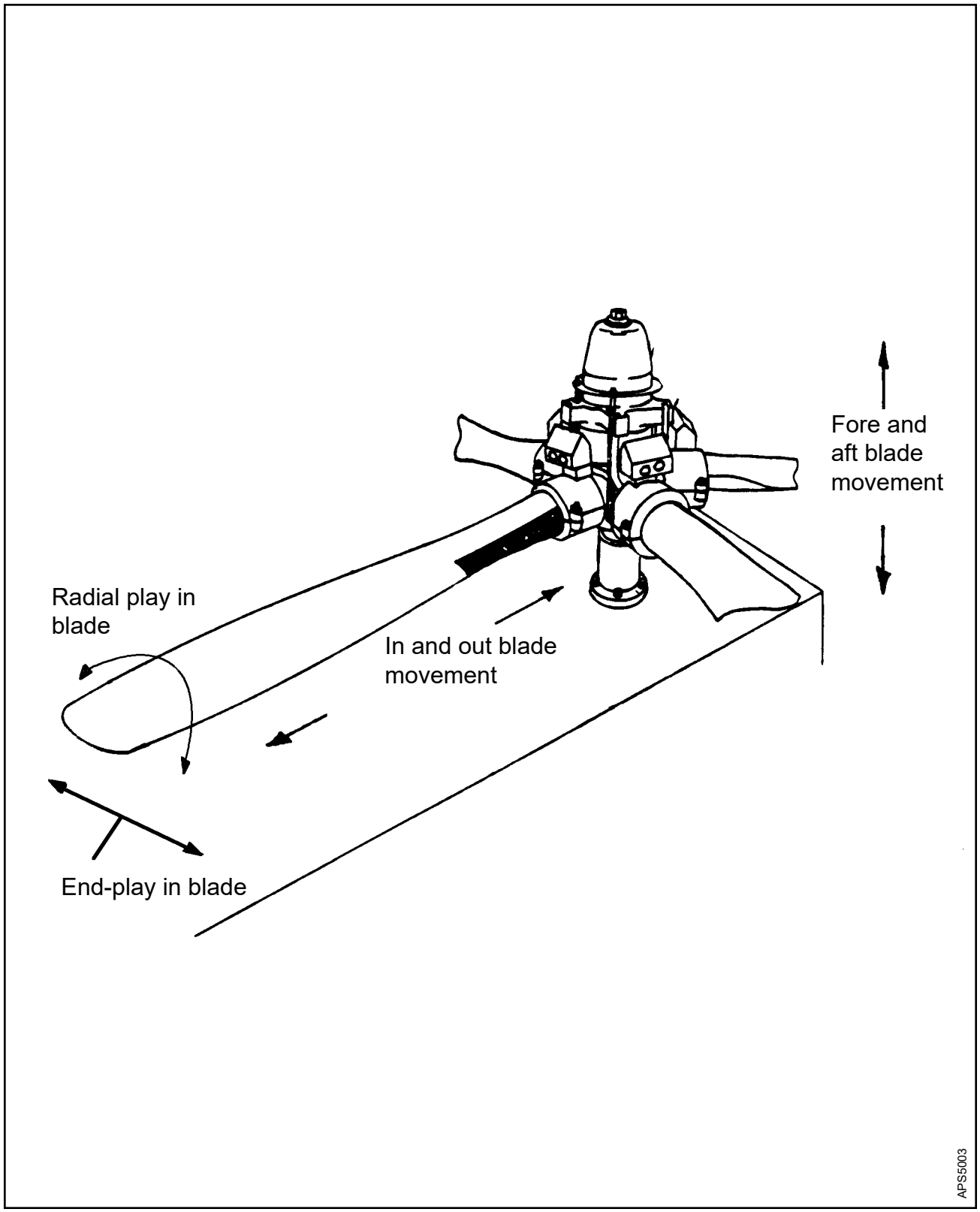
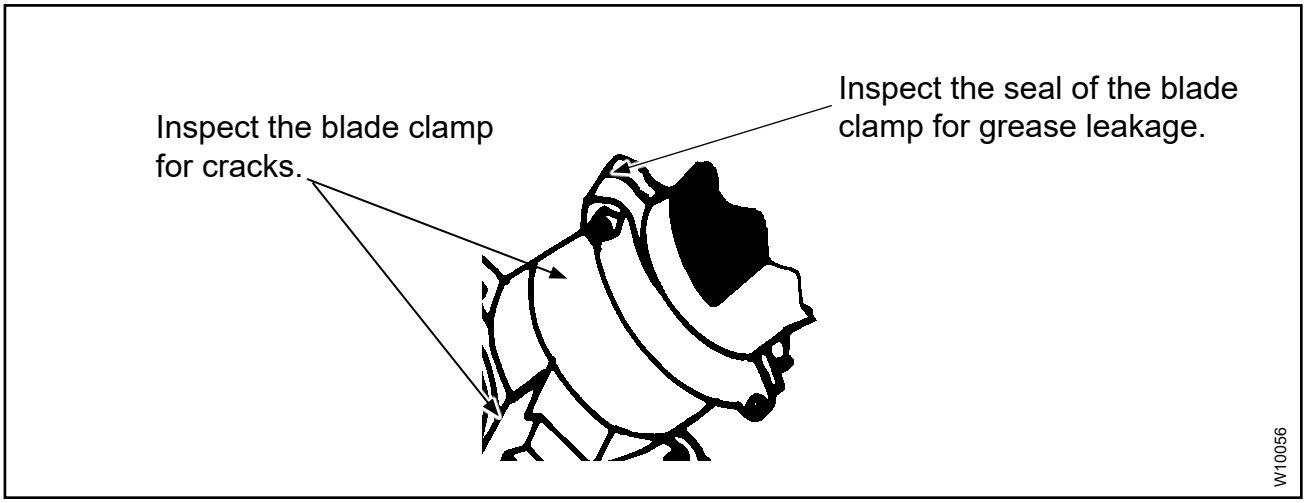


Checking Blade Movement
Figure 1-1

Problem	Probable Cause	Remedy
F. End-Play Movement in Blade. Refer to Figure 1-1.	Buildup of wear or repair tolerances.	A total of 0.100 inch (2.54 mm) end-play is permitted. Refer to the Check chapter of this manual.
G. In-and-Out Movement in Blade. Refer to Figure 1-1.	Buildup of wear or repair tolerances.	Without grease or split-bearings in the blade clamps, the maximum permitted in-and-out movement is 0.100 inch (2.54 mm). With grease and split-bearings in the blade clamps, in-and-out movement in the blades is not permitted. Refer to the Check chapter of this manual.
H. Fore-and-Aft Movement in Blade. Refer to Figure 1-1.	Buildup of allowable wear or repair tolerances.	A total of 0.100 inch (2.54 mm) fore-and-aft movement is permitted. Refer to the Check chapter of this manual. Refer to Hartzell Propeller Inc. Aluminum Blade Overhaul Manual 133C (61-13-33).
I. Blades not Tracking	Ground strike damage.	Refer to the Special Inspections chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).
	Hub pilot tube(s) distorted.	Refer to the Steel Hub Overhaul chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).
	Blade face(s) out of alignment.	Refer to Hartzell Propeller Inc. Aluminum Blade Overhaul Manual 133C (61-13-33).

	Problem	Probable Cause	Remedy
J.	Radial Play in the Blade	Wear in the link arm screw hole.	Check the link arm in accordance with the Check chapter of this manual. Replace the link arm if it is beyond servicable limits. Remove the blade and clamp in accordance with the Disassembly chapter in this manual. Clean the blade and clamp thoroughly. Reinstall the blade and clamp in accordance with the Assembly chapter of this manual. Use caution to avoid excessive sealant.
K.	Blade Slippage in the Blade Clamp	There is not enough clamping action.	Increase clamping action as necessary. Refer to the Blade Clamp Overhaul chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).
L.	Excessive Propeller Vibration	Blade slipped in clamp.	Inspect blade-to-blade angles and reset as required.
	Refer to Figure 1-2.	Mass imbalance.	Balance the propeller in accordance with the Static and Dynamic Balance chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).
		The link arm hole is worn.	Inspect the link arm in accordance to the Check chapter of this manual and replace as necessary.
		Bent, cracked, or damaged blade.	Refer to Hartzell Manual 133C (61-13-33) for aluminum blade overhaul procedures and the Special inspection chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).

Problem	Probable Cause	Remedy
L. Excessive Propeller Vibration, Continued	Blade aerodynamic imbalance due to excessive differences in blade-to-blade angles.	Perform blade-to-blade angle checks at the setup blade radius, at a blade radius six inches outboard of the setup blade radius, and at a blade radius six inches inboard of the setup blade radius. If a blade is consistantly high or low at all three locations, rotate the blade in the clamp to minimize blade angle variance, and recheck the blade-to-blade angles.
	The link arm is disconnected from the piston.	Threads in the link pin unit safety screw hole are worn or damaged. Repair the threads in accordance with the Standard Repairs chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).
	Blade slipped in the clamp.	Inspect blade to blade angles. Refer to the aircraft type certificate data sheet, or Hartzell Propeller Inc. Application Guide Manual 159 (61-02-59) for required blade angles.
	Damaged hub.	Replace the hub.
	Cracked or damaged hub.	Replace the hub.



Abnormal Vibration
Figure 1-2

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.

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DISASSEMBLY - CONTENTS

LIST OF FIGURES

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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 Disassembly

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

(a) For the location of the serial number on the hub, refer to the Parts Identification and Marking chapter of Hartzell Propeller 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/arm from which it was removed.

C. Ice Protection System (if applicable)

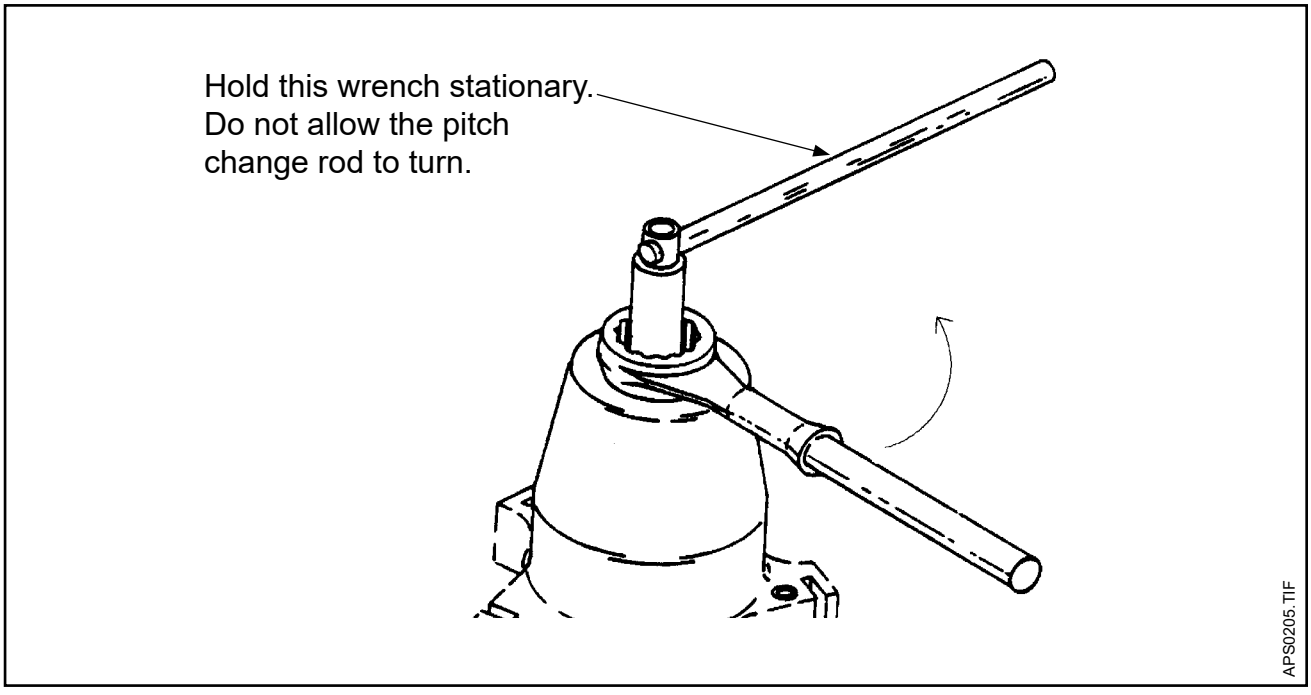
(1) If the propeller is equipped with an ice protection system supplied by Hartzell, refer to Hartzell Propeller Inc. Ice Protection System Manual 180 (30-61-80) for technical information about the applicable ice protection system.

(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. Disassembly of Flanged-Hub Models in -2 Series Propellers

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

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



Removing Self-Locking Nut
Figure 3-1

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

CAUTION 3: DO NOT USE MORE THAN 125 PSI (8.62 BARS) OF PRESSURE WHEN ACTUATING PROPELLERS INCLUDED IN THIS MANUAL.

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

A. Removing the Piston

Refer to Figure 3-1.

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

CAUTION 1: THE PROPELLER MUST BE IN FEATHER POSITION BEFORE IT IS DISASSEMBLED.

CAUTION 2: THERE MUST BE NO AIR PRESSURE APPLIED TO THE PROPELLER WHEN REMOVING THE SELF LOCKING NUT (10) THAT RETAINS THE PISTON ASSEMBLY (20).

WARNING: DO NOT PERMIT THE PITCH CHANGE ROD (670) TO TURN WHILE THE SELF LOCKING NUT (10) IS BEING REMOVED.

(2) Using a round bottom stamp, mark the piston assembly to indicate blade sequence.

(3) Using wrench TE144, or equivalent, on the self locking nut (10), and a socket on the pitch change rod (670), loosen and remove the self locking nut that secures the piston assembly (20). Discard the self locking nut.

(4) Remove the screws (90) that secure the link pin units (80). Discard the screws.

(5) Remove and discard the link pin units (80) from the piston assembly (20).

(6) Remove the link arms (100) from the piston assembly (20).

(7) Remove the cap screws (150), nuts (140), washers (130), and low stop spacers (135) from the end of the piston guide rods as applicable.

(8) Slide the piston assembly (20) off the cylinder (540) and pitch change rod (670).

(9) Remove and discard the dust seal (205) and O-ring (215) from the inside diameter of the piston assembly (20).

B. Removing the Spring Assembly

(1) Remove the pitch stop spacers (550) and screws (560). Discard the screws.

CAUTION: DO NOT USE FORCE ON THE SPRING ASSEMBLY (600) TO RELEASE THE FRONT SPLIT KEEPER (530) IN THE CYLINDER (540). FORCING THE SPRING ASSEMBLY MAY CAUSE THE RELEASE OF THE REAR SPLIT KEEPER (640) INSIDE THE SPRING ASSEMBLY.

(2) Remove the front split keeper (530) by pushing the spring assembly (600) into the cylinder (540) about 0.25 inch (6.35 mm), allowing the front split keeper halves (530) to fall out of the groove in the cylinder.

C. Removing the Guide Collar and Cylinder

(1) If applicable, use a round bottom stamp and mark the guide collar to indicate blade sequence.

(2) Loosen the self-locking socket head cap screw (1080) in the side of the guide collar unit (1060).

CAUTION: UNSCREW THE CYLINDER (540) SLOWLY AND CAREFULLY TO AVOID DAMAGING THE THREADS.

(3) Use a square-bar of appropriate size to fit into the slot in the top of the cylinder (540) and serve as a wrench to slowly unscrew the cylinder from the hub unit (700).

(4) Remove the cylinder (540).

(5) Remove the guide collar unit (1060) and discard the self-locking socket head cap screw (1080).

(6) Remove and discard the cylinder O-ring (520).

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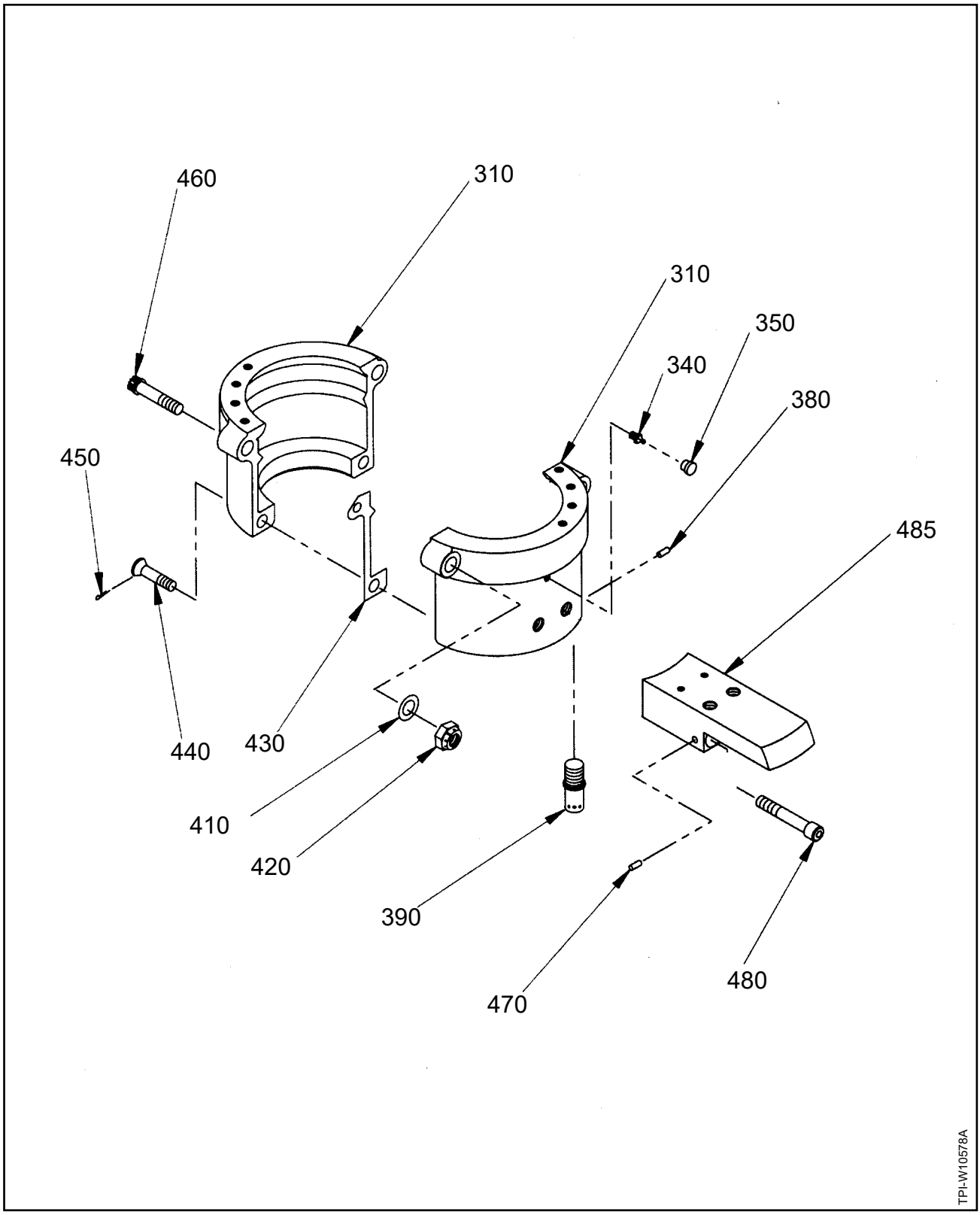


Clamp Assembly
Figure 3-2

D. Clamp and Counterweight Disassembly

Refer to Figure 3-2.

(1) Use a round bottom stamp or electric pencil and identify the clamp serial number on each corresponding counterweight (485).

(2) Remove and discard all outboard clamp bolts (460), washers (410) if applicable, and self-locking nuts (420).

(3) Remove and discard all inboard clamp socket screws (440) and cotter pins (450).

(4) Remove all blade clamp-halves (310) from the hub arms.

(5) Remove and discard the clamp gasket (430).

(6) Remove and discard balance weight screws (750).

(7) Remove all balance weights (760).

(8) Remove and discard the cotter pin (280) from each linkscrew (390).

(9) Disengage the link arms (100) from the linkscrews (80).

(10) Remove and discard the linkscrews (390), staking pins (380), and linkscrew bushings (110) if applicable.

(11) Remove and discard the linkarm bushing (385).

(12) Remove the start lock plate fasteners (1410) and the start lock plates (1400) from the clamp-halves (310), if applicable. Discard the start lock plate fasteners.

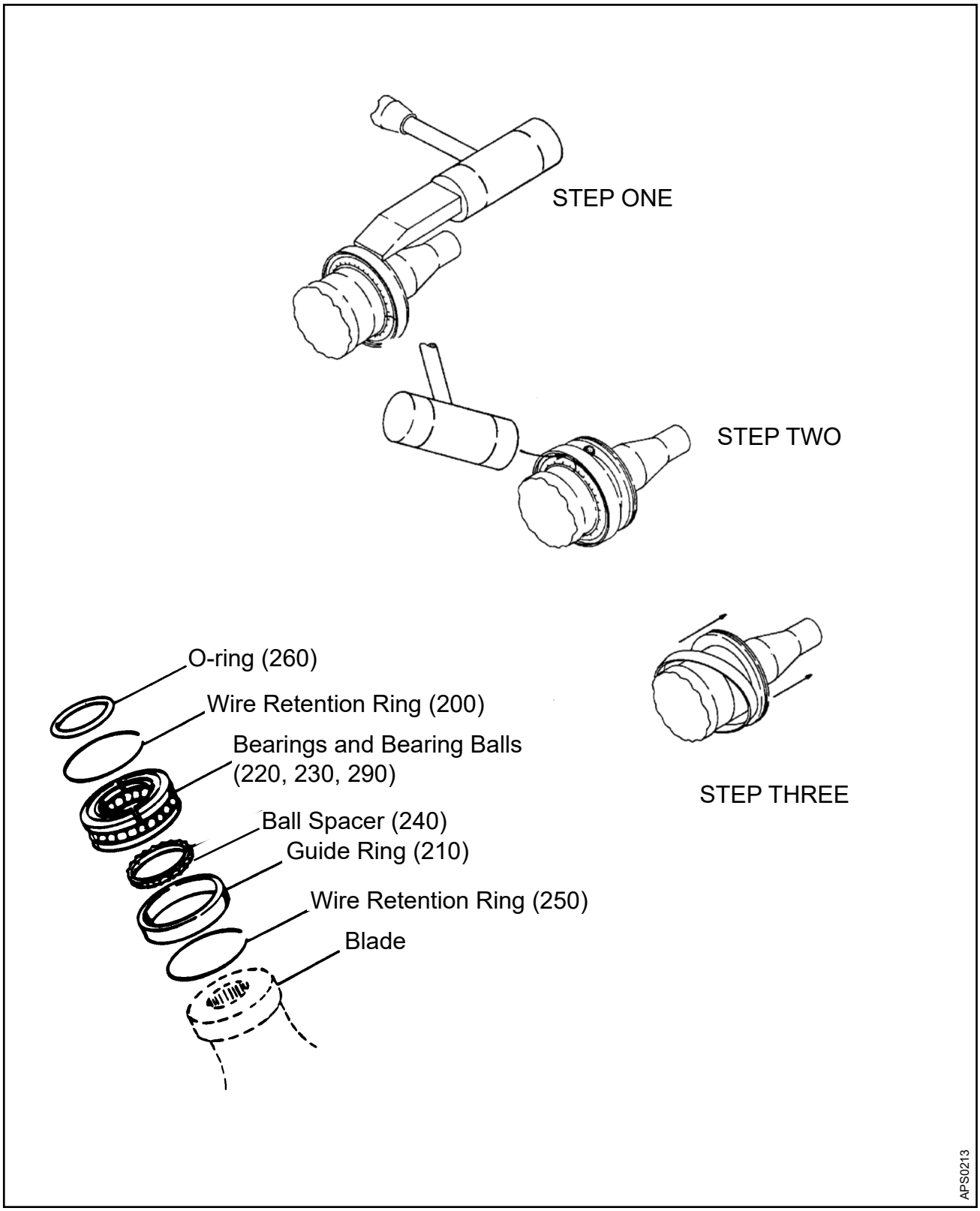
(13) For blade clamp overhaul instructions, refer to the Blade Clamp Overhaul chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).

NOTE: If possible, each blade assembly should be reinstalled on the hub arm from which it was removed. Record each blade serial number and its matching hub arm and clamp.

CAUTION: BE CAREFUL NOT TO DAMAGE THE BLADES WHEN THEY ARE REMOVED AND STORED.

(14) Remove each blade assembly from its hub pilot tube (720).

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



Removing Bearing Retention Ring
Figure 3-3

E. Blade Mounting Parts Disassembly

Refer to Figure 3-3.

(1) Remove and discard the wire retention ring (200) from its groove in the inboard bearing race (290).

(2) Remove the two halves of the inboard blade race (290).

(3) Remove and discard the thrust bearing balls (230).

(4) Remove and discard the ball spacer (240).

(5) Remove and discard the blade O-ring (260).

(6) As shown in Step One, Figure 3-3, use a mallet and soft punch at several places on the outboard edge of the bearing guide ring (210) to drive the ring inboard over the shoulder of the hub arm.

(7) Remove the wire retention ring (250) that had been covered by the bearing guide ring (210).

(8) Discard the wire retention ring (250).

(9) As shown in Step Two, Figure 3-3, turn the halves of the inboard bearing race (290) so the parting line is at the top.

(10) At the parting line, place one of the thrust bearing balls (230) between the outboard bearing race (220) and inboard shoulder of the hub arm.

(11) With a soft mallet, lightly tap the inboard top edge of the bearing guide ring (210) to dislodge the outboard bearing race (290).

(12) Remove the halves of the outboard bearing race (290).

(13) Tilt the bearing guide ring (210) inboard to an angle of approximately 45 degrees, and remove the ring by sliding it outboard over the shoulder of the hub arm. Refer to Figure 3-3, Step Three.

F. Hub Unit Disassembly

(1) For steel hub disassembly and overhaul procedures refer to the Steel Hub Overhaul chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).

G. Start Lock Disassembly

Refer to Figure 3-4.

(1) Remove and discard the start lock mounting hardware.

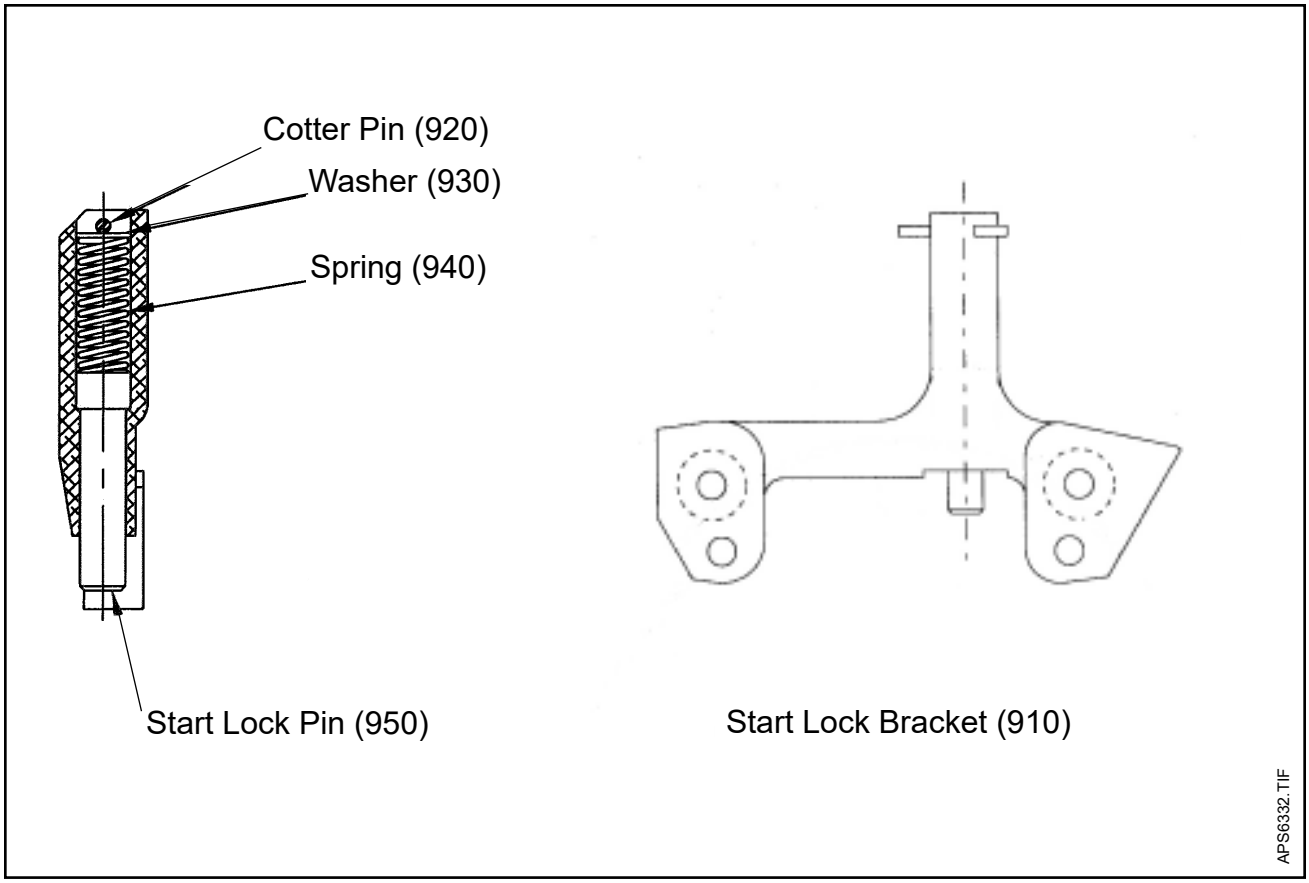
WARNING: THE SPRING (940) IS COMPRESSED AND WILL BE RELEASED WHEN THE COTTER PIN (920) IS REMOVED.

(2) Remove and discard the cotter pin (920) from the start lock bracket (910).

(3) Remove and discard the washer (930) from the start lock bracket (910).

(4) Remove and discard the spring (940) from the start lock bracket (910).

(5) Remove the start lock pin (950) from the start lock bracket (910).



Start Lock Unit
Figure 3-4

H. Disassembling the Spring Assembly

Refer to Figure 3-5.

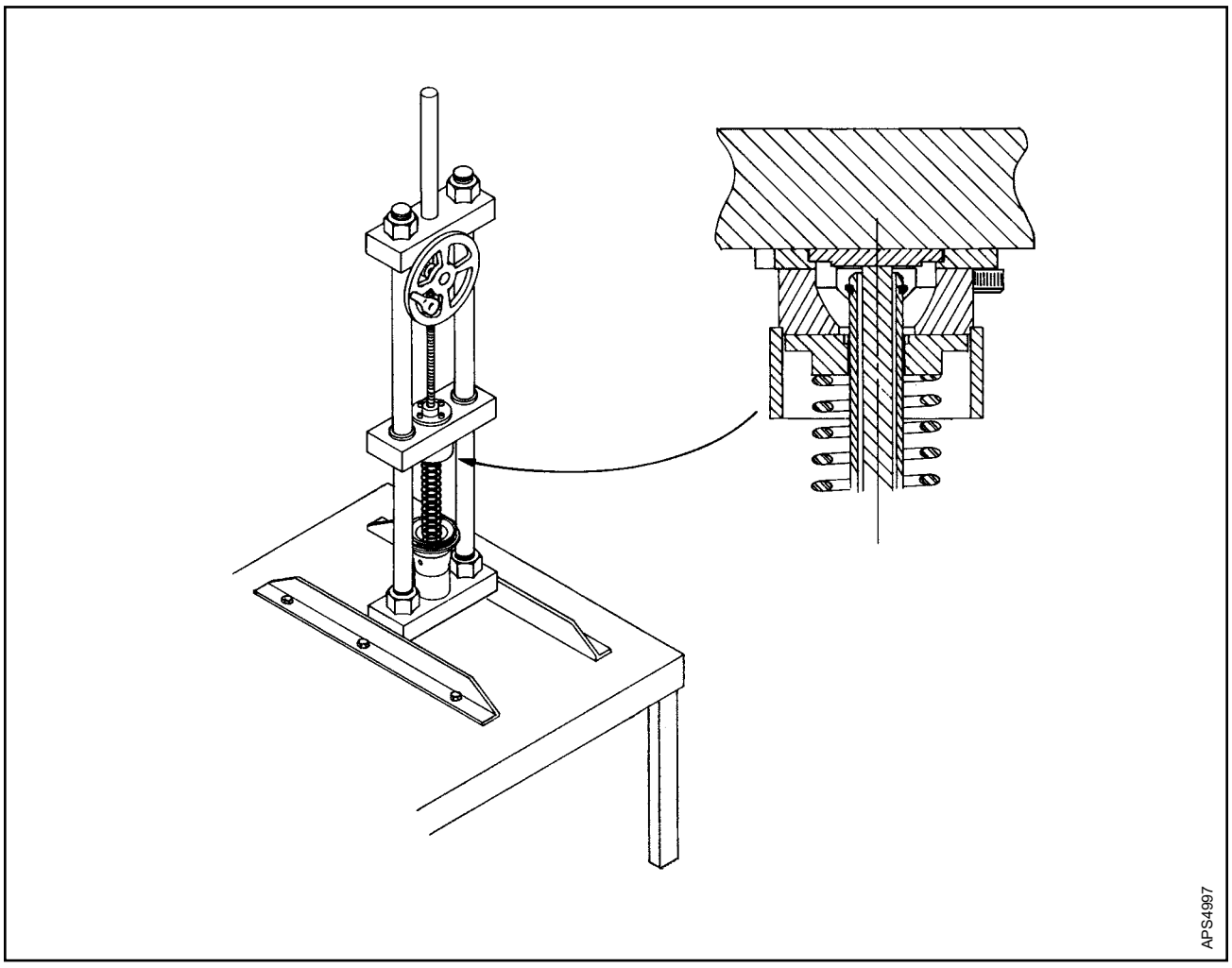
WARNING: THE SPRING ASSEMBLY (600) IS PRELOADED TO APPROXIMATELY 400 POUNDS FORCE. USE EXTREME CAUTION WHEN REMOVING IT FROM THE PROPELLER AND WHEN DISASSEMBLING IT.

(1) Use the bench-top spring compressor fixture TE59, or equivalent, to compress the spring assembly (600).

(2) Remove and discard the rear split keeper (640).

(3) Permit the spring assembly (600) to expand to its uncompressed length, and remove it from the special fixture.

(4) Disassemble the remaining spring assembly component parts.



Putting the Spring Assembly in the Spring Compressor Fixture
Figure 3-5

3. Disassembly of Splined-Hub Models in the -2 Series

CAUTION 1: ACTUATION OF PROPELLERS IS TO BE ACCOMPLISHED USING COMPRESSED AIR THAT HAS BEEN FILTERED FOR MOISTURE, OR NITROGEN.

CAUTION 2: DO NOT EXCEED A PRESSURE OF 125 PSI (8.62 BARS) WHEN ACTUATING PROPELLERS COVERED IN THIS CHAPTER.

CAUTION 3: USE SUFFICIENT AIR PRESSURE TO ENSURE THAT THE PROPELLER ACTUATES AGAINST EACH POSITIVE STOP.

Refer to the applicable figures in the Illustrated Parts List chapter of this manual.

A. Marking Before Disassembly

CAUTION: 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.

(1) Record 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.

(2) Keep parts with their respective assemblies and note the locations of these parts, to minimize reassembly problems with propeller balance and blade angle setting.

CAUTION: GRAPHITE (LEAD) PENCIL MARKS WILL CAUSE CORROSION.

(3) Using crayon or soft, non-graphite pencil CM162, number the blades counterclockwise from the propeller serial number on the hub (as viewed from the front or piston side).

(4) Record each blade serial number and its matching hub arm and clamp.

B. Removing the Guide Collar and Cylinder (if applicable)

(1) Loosen the self-locking socket head cap screw (1080) in the side of the guide collar unit (1060).

CAUTION: UNSCREW THE CYLINDER (540) SLOWLY AND CAREFULLY TO AVOID DAMAGING THE THREADS.

(2) Use a square-bar of appropriate size to fit into the slot in the top of the cylinder (540) and serve as a wrench to slowly unscrew the cylinder from the hub unit (700).

(3) Remove the cylinder (540).

(4) Remove the guide collar unit (1060), if applicable. Discard the self-locking socket head cap screw (1080).

(5) Remove and discard the cylinder O-ring (520).

C. Clamp and Counterweight Disassembly

Refer to Figure 3-2.

(1) Use a round bottom stamp or electric pencil and identify the clamp serial number on each corresponding counterweight (485).

(2) Remove and discard all outboard clamp bolts (460) and self-locking nuts (420).

(3) Remove and discard all inboard clamp socket screws (440) and cotter pins (450).

(4) Remove all blade clamp-halves (310) from the hub arms.

(5) Remove and discard the clamp gasket (430).

(6) Remove and discard balance weight screws (750).

(7) Remove all balance weights (760).

(8) Remove and discard the cotter pin (280) from each linkscrew (390).

(9) Disengage the link arms (100) from the linkscrews (80).

(10) Remove and discard the linkscrews (390), staking pins (380), and linkarm bushings (110) if applicable.

(11) Remove and discard the linkarm bushing (385).

(12) Remove the start lock plate fasteners (1410) and the start lock plates (1400) from the clamp-halves (310) if applicable. Discard the start lock plate fasteners.

(13) For blade clamp overhaul instructions, refer to the Blade Clamp Overhaul chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).

NOTE: If possible, each blade assembly should be reinstalled on the hub arm from which it was removed. Record each blade serial number and its matching hub arm and clamp.

CAUTION: BE CAREFUL NOT TO DAMAGE THE BLADES WHEN THEY ARE REMOVED AND STORED.

(14) Remove each blade assembly from its hub pilot tube (720).

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

D. Blade Mounting Parts Disassembly

Refer to Figure 3-3.

(1) Remove and discard the wire retention ring (200) from its groove in the inboard bearing race (290).

(2) Remove the two halves of the inboard blade race (290).

(3) Remove and discard the thrust bearing balls (230).

(4) Remove and discard the ball spacer (240).

(5) Remove and discard the blade O-ring (260).

(6) As shown in Step One, Figure 3-3, use a mallet and soft punch at several places on the outboard edge of the bearing guide ring (210) to drive the ring inboard over the shoulder of the hub arm.

(7) Remove the wire retention ring (250) that had been covered by the bearing guide ring (210).

(8) Discard the wire retention ring (250).

(9) As shown in Step Two, Figure 3-3, turn the halves of the inboard bearing race (290) so the parting line is at the top.

(10) At the parting line, place one of the thrust bearing balls (230) between the outboard bearing race (220) and inboard shoulder of the hub arm.

(11) With a soft mallet, lightly tap the inboard top edge of the bearing guide ring (210) to dislodge the outboard bearing race (290).

(12) Remove the halves of the outboard bearing race (290).

(13) Tilt the bearing guide ring (210) inboard to an angle of approximately 45 degrees, and remove the ring by sliding it outboard over the shoulder of the hub arm. Refer to Figure 3-3, Step Three.

E. Hub Unit Disassembly

(1) Remove the shaft nut (690) and puller ring (790). Inspect and repair the shaft nut and puller ring in accordance with this manual.

(2) For steel hub disassembly and overhaul procedures refer to the Steel Hub Overhaul chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).

F. Start Lock Disassembly

Refer to Figure 3-4.

(1) Remove and discard the start lock mounting hardware.

(2) Remove and discard the cotter pin (920) from the start lock bracket (910).

WARNING: THE SPRING (940) IS COMPRESSED AND WILL BE RELEASED WHEN THE COTTER PIN (920) IS REMOVED.

(3) Remove and discard the washer (930) from the start lock bracket (910).

(4) Remove and discard the spring (940) from the start lock bracket (910).

(5) Remove the start lock pin (950) from the start lock bracket (910).

G. Disassembling the Spring Assembly

Refer to Figure 3-5.

WARNING: THE SPRING ASSEMBLY (600) IS PRELOADED TO APPROXIMATELY 400 POUNDS FORCE. USE EXTREME CAUTION DURING DISASSEMBLY.

(1) Use the bench-top fixture TE59, or equivalent, to compress the spring assembly (600).

(2) Remove and discard the split rear keeper (640).

(3) Allow the spring assembly (600) to expand to its uncompressed length and remove it from the special fixture.

(4) Disassemble the remaining spring assembly component parts.

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CLEANING - CONTENTS

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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 (Propellers with screw-on cylinders only)

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

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

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

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CHECK - CONTENTS

LIST OF FIGURES

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. 3)

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

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 Blade Overhaul Manual 135F (61-13-35).

D. Blade Clamps

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

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).

F. 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)

G. 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).

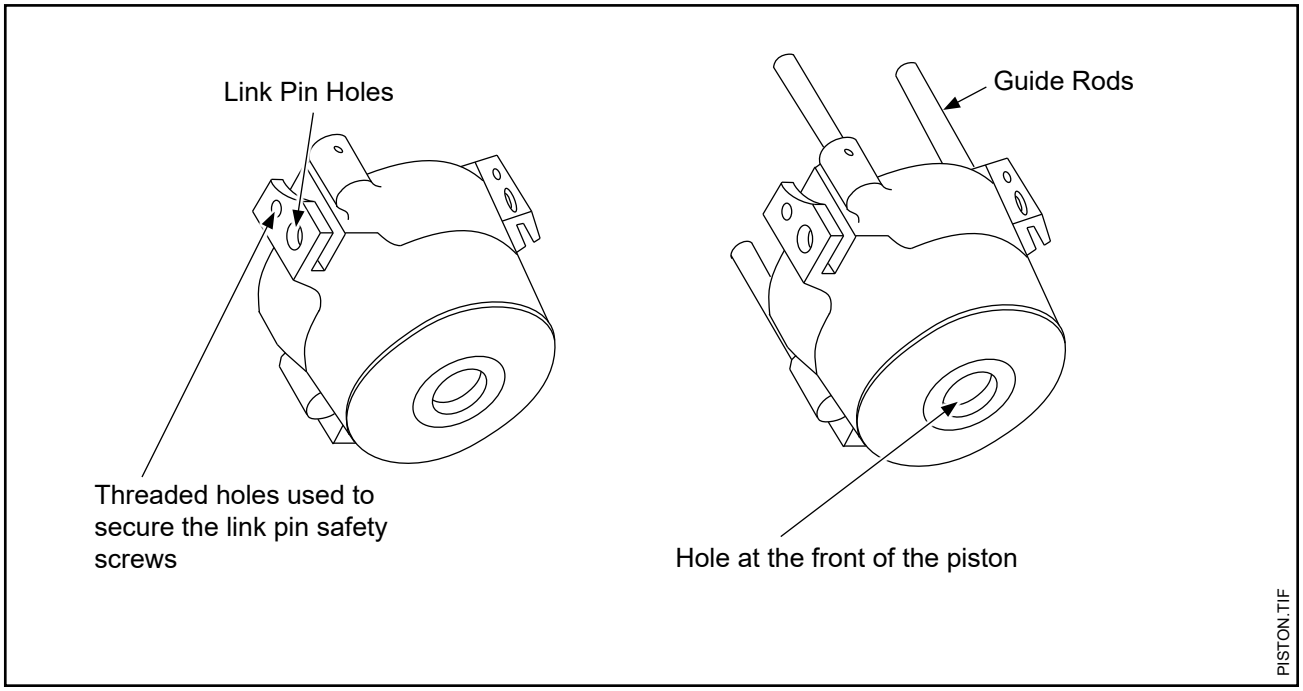
4. Propeller Component Checks

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.

Component Inspection Criteria
Table 5-1

	Inspect	Serviceable Limits	Corrective Action
A.	PISTON (Item 20) Refer to Figure 5-1.		
	(1) Visually examine the outside of the piston for corrosion product.	Corrosion product is not permitted.	If there is corrosion product, remove surface corrosion product using glass bead media cleaning in accordance with the Cleaning chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). Apply chemical conversion coating to bare aluminum in accordance with the Chromic Acid Anodizing chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). If the piston is chemical conversion coated, the outside of the piston must also be painted with a Polane paint mixture in accordance with the Paint and Finish chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).



Piston Inspection
Figure 5-1

Component Inspection Criteria
Table 5-1

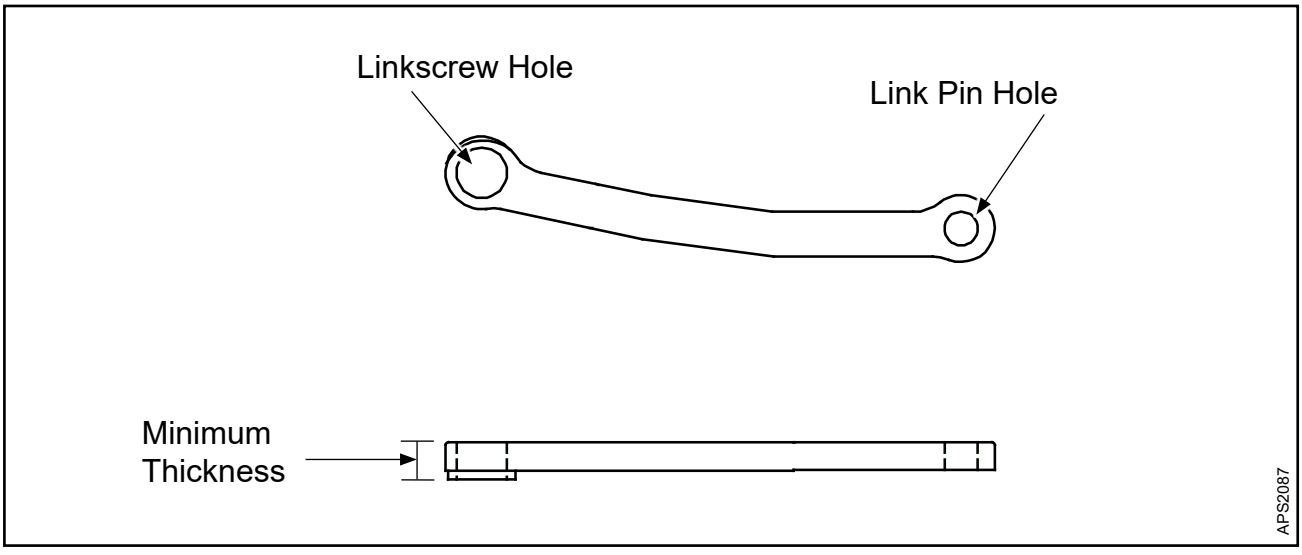
	Inspect	Serviceable Limits	Corrective Action
A.	PISTON, CONTINUED (Item 20) Refer to Figure 5-1.		
(2)	Visually examine the outside of the piston for pitting, scratches, or damage.	The maximum permitted depth of a scratch or damage is 0.006 inch (0.15 mm). A scratch must not be greater than 2 inches (50.8 mm) in length. The maximum permitted area of damage or scratches must not be greater than 1 square inch (645 square mm). The maximum permitted diameter of an individual pit is 0.0625 inch (1.588 mm). Linear pitting is not permitted.	If pitting, scratches, or damage is greater than the permitted serviceable limits, replace the piston.
(3)	Visually examine the threaded holes that are used to secure the link pin safety screws.	Adequate threads must be present to hold the safety screw in place. A minimum of three full threads are required.	Repair a damaged threaded hole in accordance with the Standard Repairs chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).
(4)	Penetrant inspect the entire piston in accordance with the Penetrant Inspection chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). It is not necessary to remove the anodized coating or the piston bushing before penetrant inspection.	A relevant indication is not permitted.	If there is a relevant indication, replace the piston.
(5)	Visually examine the hole at the front of the piston for damage caused by inserting or removing the piston from the pitch change rod.	Damage must not interfere with the ability of the O-ring to seal.	If damage interferes with the ability of the O-ring to seal, replace the piston.

Component Inspection Criteria
Table 5-1

	Inspect	Serviceable Limits	Corrective Action
A.	PISTON, CONTINUED (Item 20) Refer to Figure 5-1.		
(6)	Visually examine the piston bushing (70) and the area surrounding the piston bushing for signs of wear. If the piston bushing or area surrounding the piston bushing shows signs of wear, measure the piston bushing.	The maximum permitted ID of the piston bushing is 3.784 inches (96.12 mm).	If the ID of the piston bushing is greater than the permitted serviceable limits, replace the bushing in accordance with the Special Adhesive and Bonding Procedures chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).
(7)	If installed, inspect each guide rod (120) for scratches, gouges, or wear.	A scratch is not permitted. Wear through the chrome plating is not permitted. A gouge is not permitted.	If there is a scratch, gouge, or wear through the chrome plating, replace the guide rod(s) in accordance with the Standard Repairs chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).
(8)	Apply hand pressure perpendicular to the centerline of each rod to make sure that each guide rod is secure in the piston.	A loose guide rod is not permitted.	If any guide rod is loose, replace the guide rod(s) in accordance with the Standard Repairs chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).
(9)	Measure the piston link holes.	The maximum permitted diameter of the piston link holes is 0.377 inch (9.58 mm).	If the diameter of the piston link holes if greater than the serviceable limits, replace the piston or return to Hartzell Propeller Inc. for factory repair.

Component Inspection Criteria
Table 5-1

	Inspect	Serviceable Limits	Corrective Action
B.	LINK ARM (Item 100) Refer to Figure 5-2.		
(1)	Visually examine the link arm for indications of twisting or distortion.	Distortion or twisting are not permitted.	If there is twisting or distortion of the link arm greater than the permitted serviceable limits, replace the link arm.
		Flatness should be less than 0.015 inch (0.38 mm).	If flatness is greater than the serviceable limits, replace the link arm.
(2)	Visually examine the link pin hole and the link screw hole.	A link pin hole or link screw hole that has been worn in an oblong shape is cause for retirement of the link arm.	If wear of the link pin hole or the link screw hole is greater than the permitted serviceable limits, replace the link arm.
(3)	Measure the ID of the link pin hole.	The maximum permitted ID of the link pin hole is 0.3785 inches (9.614 mm).	If the ID of the link pin hole is greater than the permitted serviceable limits, replace the link arm.
(4)	Measure the ID of the link screw hole.	The maximum permitted ID of the link screw hole is 0.5645 inches (14.338 mm).	If the ID of the link screw hole is greater than the permitted serviceable limits, replace the link arm.



Link Arm Inspection
Figure 5-2

Component Inspection Criteria
Table 5-1

	Inspect	Serviceable Limits	Corrective Action
B.	LINK ARM, CONTINUED (Item 100) Refer to Figure 5-2.		
(5)	Measure the thickness of the link arm end adjacent to the link screw hole.	The thickness of the link arm must be greater than 0.400 inches (10.16 mm).	If the thickness of the link arm end adjacent to the link screw hole is less than the permitted serviceable limits, replace the link arm.
(6)	Magnetic particle inspect each link arm 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 link arm.
(7)	Visually examine the link arm for wear to the cadmium plating.	A few random scratches are permitted; otherwise, cadmium plating must completely cover the link arm.	If cadmium plating coverage is less than the permitted serviceable limits, cadmium replate and bake the link arm in accordance with the Cadmium Replating chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).

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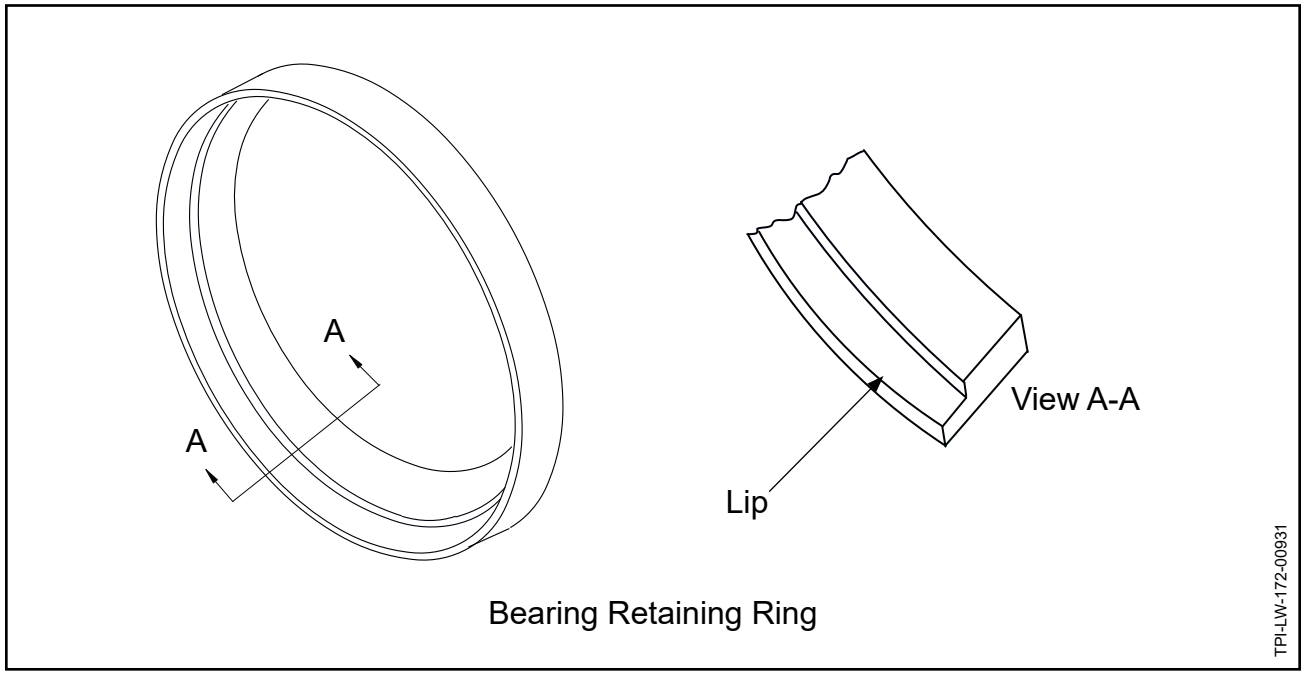
Component Inspection Criteria
Table 5-1

	Inspect	Serviceable Limits	Corrective Action
C.	BEARING RETAINING RING (Item 210) Refer to Figure 5-3.		
(1)	Visually examine the bearing retaining ring for corrosion product.	Corrosion product is not permitted. If there is corrosion product, remove it in accordance with the corrective action repair limits.	Remove corrosion product using glass bead cleaning. Refer to the Cleaning chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). If the corrosion product cannot be removed, replace the bearing retaining ring.
(2)	Visually examine the bearing retaining ring for pitting.	The maximum permitted depth of pitting is 0.005 inch (0.12 mm). Pitting must not interfere with the ability of the bearing retaining ring to fit tightly to the blade and the bearing race.	If the pitting is greater than the permitted serviceable limits, replace the bearing retaining ring.

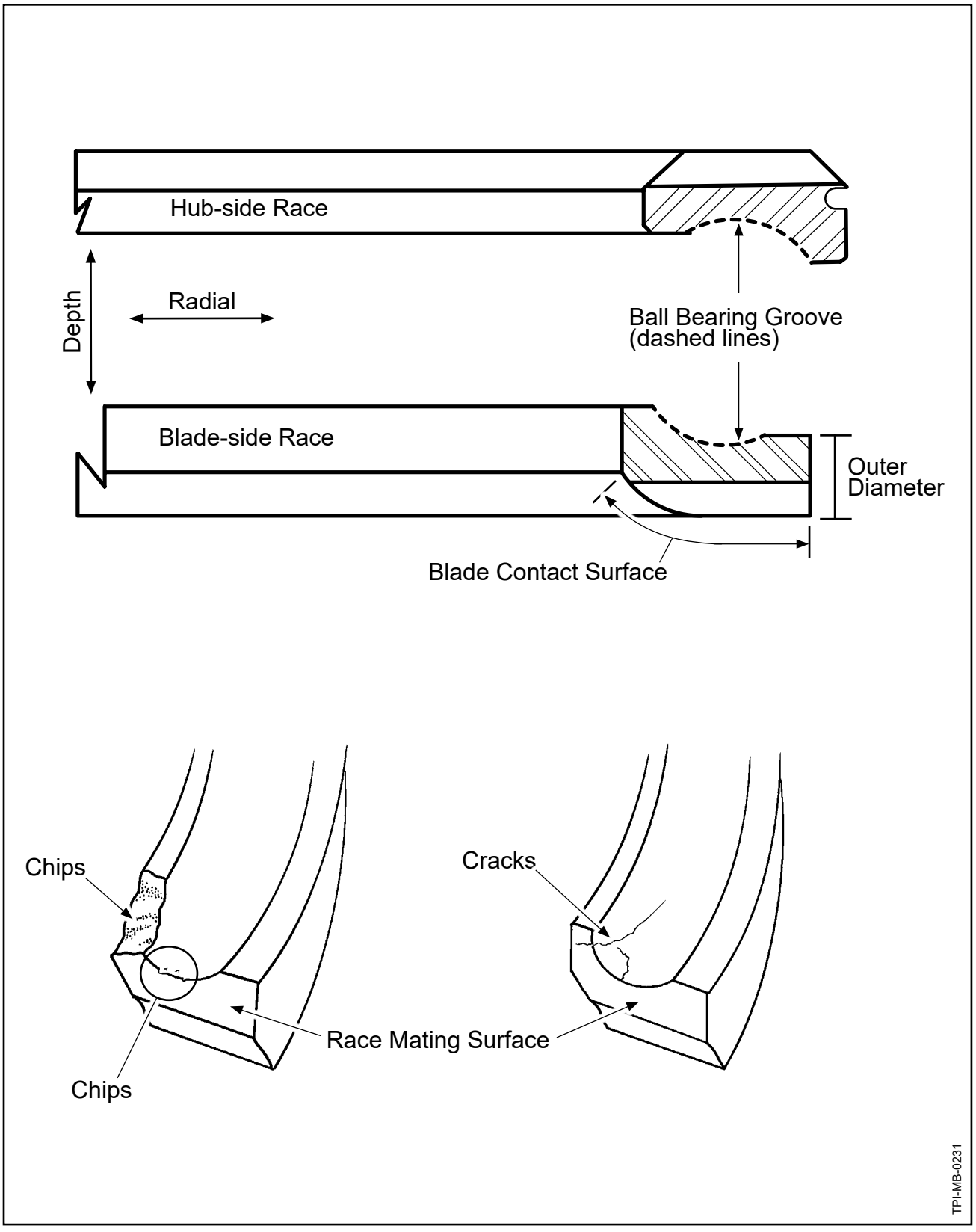


Bearing Retaining Ring

Bearing Retaining Ring
Figure 5-3

Component Inspection Criteria
Table 5-1

	Inspect	Serviceable Limits	Corrective Action
C.	BEARING RETAINING RING, CONTINUED (Item 210) Refer to Figure 5-3.		
(3)	Visually examine the bearing retaining ring for wear, damage, or fretting.	The bearing retaining ring must fit tightly to the blade and the bearing race when installed over the blade and bearing race.	If wear, damage, or fretting is greater than the permitted serviceable limits, replace the bearing retaining ring.
(4)	Visually examine the bearing retaining ring retention lip for damage.	Displaced material must not interfere with the wire ring retainer in the hub arm or rise above the normal OD of the bearing retaining ring. Sufficient lip must remain to ensure wire ring retainer in the hub arm groove when installed.	Displaced material may be removed with a file or rotary grinder. Polish displaced material to a smooth finish with an abrasive pad CM47, or equivalent.
(5)	Make sure there is an interference fit with the hub blade arm.	The bearing retaining ring must fit tight on the hub blade arm. A loose fit is not permitted.	If the bearing retaining ring is loose, replace the bearing retaining ring.
(6)	Visually examine the bearing retaining ring for cadmium plate coverage.	A few random scratches are permitted; otherwise, cadmium plate must completely cover the bearing guide ring.	Cadmium plate in accordance with the Cadmium Replating chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).
(7)	Magnetic particle inspect the bearing retaining ring in accordance with the Magnetic Particle Inspection chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). Cadmium plating removal is not required.	A relevant indication is not permitted.	If there is a relevant indication, replace the bearing retaining ring.



Bearing Race
Figure 5-4

Component Inspection Criteria
Table 5-1

	Inspect	Serviceable Limits	Corrective Action
D.	BEARING RACE (Item 220, 290) Refer to Figure 5-4.		
(1)	Visually examine the ball bearing groove in each bearing race for corrosion product.	Corrosion product is not permitted.	Remove corrosion product, using glass bead cleaning in accordance with the Cleaning chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). If corrosion product cannot be removed, replace the bearing race.
(2)	Visually examine the ball bearing groove in each bearing race for pitting, wear, fretting, and damage.	The maximum permitted depth of pitting is 0.003 inch (0.076 mm) in the ball bearing groove. The maximum permitted diameter of a pit is 0.032 inch (0.81 mm). The maximum permitted total area of pitting in the ball bearing groove on a complete bearing race is 0.12 square inch (77.4 square mm) (two bearing races for each bearing set). Pitting must not interfere with bearing ball movement or support.	If the pitting is greater than the serviceable limits, replace the bearing race.
		If the ball bearing groove has wear, measure the wear. The maximum permitted depth of wear is 0.005 inch (0.12 mm).	If the wear is greater than the permitted serviceable limits, replace the bearing race.
		Fretting damage is not permitted.	If there is fretting damage, replace the bearing race.
		For damage other than pitting or fretting, the maximum permitted depth of damage is 0.003 inch (0.076 mm) and must not interfere with bearing ball movement or support.	If damage is greater than the permitted serviceable limits, replace the bearing race.

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
D. BEARING RACE, CONTINUED (Item 220, 290) Refer to Figure 5-4.		
(3) Except for the ball bearing groove, visually examine all other surfaces of each bearing race for corrosion product.	Corrosion product is not permitted.	Remove corrosion product, using glass bead cleaning in accordance with the Cleaning chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). If corrosion product cannot be removed, replace the bearing race.
(4) Except for the ball bearing groove, visually examine all other surfaces of each bearing race for pitting, wear, fretting, and damage.	The maximum permitted depth of pitting is 0.005 inch (0.12 mm). The maximum permitted diameter of a pit is 0.062 inch (1.57 mm). The maximum permitted total area of pitting on all surfaces except the ball bearing groove of a complete bearing race is 0.25 square inch (161.2 square mm) (two bearing races for each bearing set).	If the pitting is greater than the permitted serviceable limits, replace the bearing race.
	Fretting damage is permitted on the outer diameter of the bearing races that interface with the bearing retaining ring (210). Fretting must not loosen the tight fit with the bearing retaining ring (210).	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 (210) to the bearing race is not tight, replace the bearing race.
	Wear is not permitted.	If there is wear, replace the bearing race.
	For damage other than pitting, the maximum permitted depth of damage is 0.005 inch (0.12 mm) and must not interfere with the mating surfaces.	If the damage is greater than the permitted serviceable limits, replace the bearing race.

Component Inspection Criteria
Table 5-1

	Inspect	Serviceable Limits	Corrective Action
D.	BEARING RACE, CONTINUED (Item 220, 290) Refer to Figure 5-4.		
(5)	Visually examine the bearing race for chips or cracks that are adjacent to the mating surfaces of the bearing race.	Chips or cracks that are adjacent to the mating surfaces of the bearing race are not permitted.	If there are chips or cracks adjacent to the mating surfaces of the bearing race, replace the bearing race.
(6)	Magnetic particle inspect each bearing race in accordance with the Magnetic Particle Inspection chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).	A relevant indication is not permitted.	If there is a relevant indication, replace the bearing race.

Component Inspection Criteria
Table 5-1

	Inspect	Serviceable Limits	Corrective Action
E.	SPLIT KEEPER (Item 530)		
(1)	Visually examine the split keeper for corrosion product.	Corrosion product is not permitted.	Remove corrosion product, using glass bead cleaning in accordance with the Cleaning chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). If corrosion product cannot be removed, replace the split keeper.
(2)	Visually examine the split keeper for pitting.	The maximum permitted depth of pitting is 0.005 inch (0.12 mm).	If the pitting is greater than the permitted serviceable limits, replace the split keeper.
(3)	Visually examine the split keeper for scratches.	The maximum permitted depth of a scratch is 0.005 inch (0.12 mm).	If the scratch is greater than the permitted serviceable limits, replace the split keeper.
(4)	Visually examine the split keeper for cadmium plate coverage.	A few random scratches are acceptable; otherwise, cadmium plate must completely cover the split keeper.	Cadmium plate the split keeper in accordance with the Cadmium Replating chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).
(5)	Magnetic particle inspect the split keeper in accordance with the Magnetic Particle Inspection chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). Removal of cadmium plate is not required.	A relevant indication is not permitted.	If there is a relevant indication, replace the split keeper.

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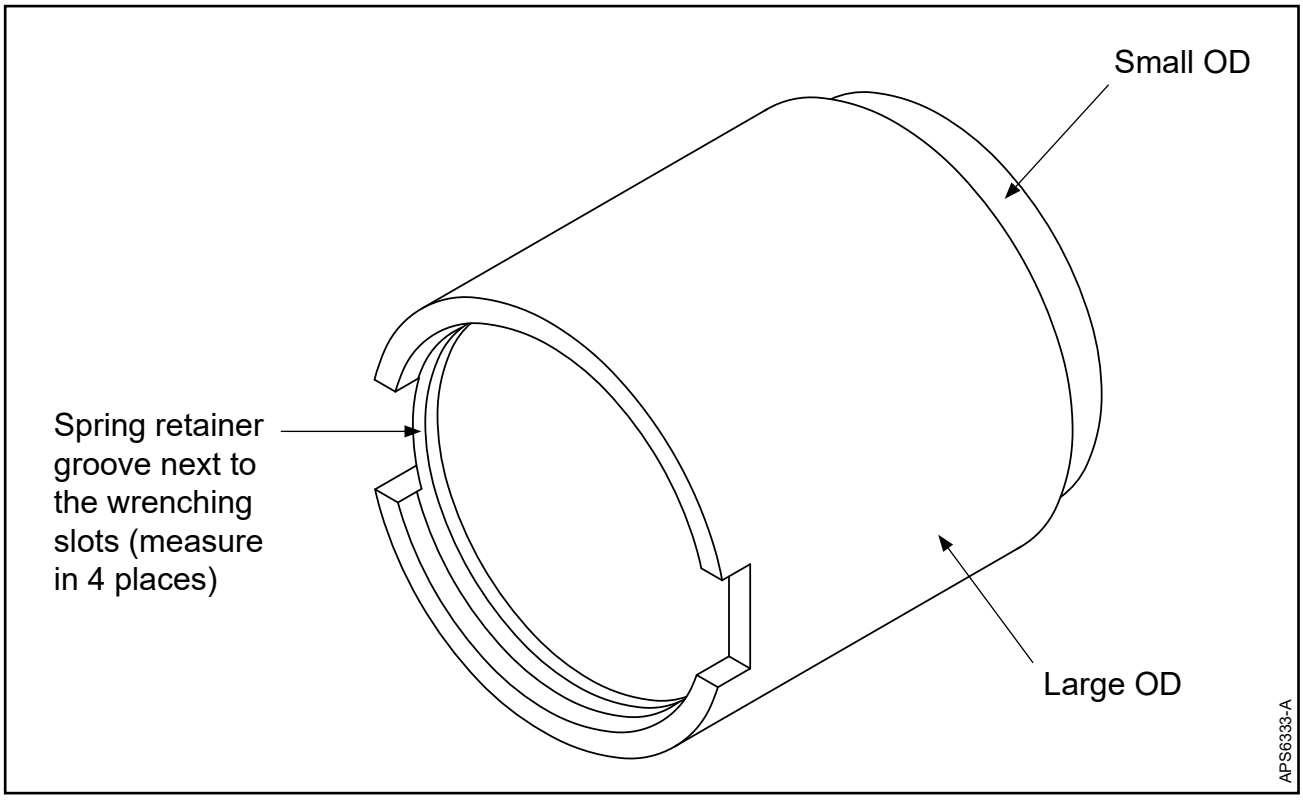
Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
F. CYLINDER (Item 540) Refer to Figure 5-5.		
(1) Visually examine all threaded surfaces on the cylinder.	One damaged thread is permitted.	If the damage is greater than the permitted serviceable limits, replace the cylinder.
(2) Visually examine the cylinder for chrome plate coverage.	Flaking of the chrome finish is not permitted. Minor wear that is within the permitted serviceable limits and random, light scratches that are not greater than the chrome depth and do not interfere with the seal of the O-ring are permitted. Otherwise, complete chrome coverage is required.	If the wear or damage is greater than the permitted serviceable limits, repair or replace the cylinder. For cylinder repair and rechroming procedures, refer to the Hard Chromium Replating chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).



Cylinder Inspection
Figure 5-5

Component Inspection Criteria
Table 5-1

	Inspect	Serviceable Limits	Corrective Action
F.	CYLINDER, CONTINUED (Item 540) Refer to Figure 5-5.		
(3)	Visually examine the normal operating area of the cylinder for scratches, wear, or gouges.	The maximum permitted depth of a scratch, wear, or gouge is 0.001 inch (0.025 mm).	If the scratches, wear, or gouges are deeper than the permitted serviceable limits, repair or replace the cylinder. For cylinder repair and rechroming procedures, refer to the Hard Chromium Replating chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).
(4)	Measure the large OD and the small OD of the cylinder.	The minimum permitted large OD is 3.773 inches (95.84 mm). The minimum permitted small OD is 3.496 inches (88.80 mm).	If the large OD or small OD of the cylinder is less than the permitted serviceable limits, repair or replace the cylinder. For cylinder repair and rechroming procedures, refer to the Hard Chromium Replating chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).
(5)	Magnetic particle inspect the cylinder at each overhaul in accordance with the Magnetic Particle Inspection chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). Removal of hard chrome plating before doing Magnetic Particle Inspection is not required.	A relevant indication is not permitted.	If there is a relevant indication, replace the cylinder.

Component Inspection Criteria
Table 5-1

	Inspect	Serviceable Limits	Corrective Action
G.	PITCH STOP SPACER (Item 550)		
(1)	Visually examine the pitch stop spacer for corrosion product.	Corrosion product is not permitted.	Remove corrosion product, using glass bead cleaning in accordance with the Cleaning chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). If corrosion product cannot be removed, replace the pitch stop spacer.
(2)	Visually examine the pitch stop spacer for pitting.	The maximum permitted depth of pitting is 0.005 inch (0.12 mm).	If the pitting is greater than the permitted serviceable limits, replace the pitch stop spacer.
(3)	Visually examine the pitch stop spacer for cadmium plate coverage.	A few random scratches are acceptable; otherwise, cadmium plate must completely cover the pitch stop spacer.	Cadmium plate the pitch stop spacer in accordance with the Cadmium Replating chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).
(4)	Magnetic particle inspect the pitch stop spacer in accordance with the Magnetic Particle Inspection chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). Removal of cadmium plate is not required.	A relevant indication is not permitted.	If there is a relevant indication, replace the pitch stop spacer.

Component Inspection Criteria
Table 5-1

	Inspect	Serviceable Limits	Corrective Action
H.	STOP SLEEVE (Item 620)		
(1)	Visually examine the stop sleeve for corrosion product.	Corrosion product is not permitted.	Remove corrosion product, using glass bead cleaning in accordance with the Cleaning chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). If corrosion product cannot be removed, replace the stop sleeve.
(2)	Visually examine the stop sleeve for indications of wear or pitting.	The maximum permitted depth of wear or pitting is 0.005 inch (0.12 mm).	If the wear or pitting is greater than the permitted serviceable limits, replace the stop sleeve.
I.	PITCH STOP SPACER (Item 615, 625)		
(1)	Visually examine the pitch stop spacer for corrosion product.	Corrosion product is not permitted.	Remove corrosion product, using glass bead cleaning in accordance with the Cleaning chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). If corrosion product cannot be removed, replace the pitch stop spacer.
(2)	Visually examine the pitch stop spacer for pitting.	The maximum permitted depth of pitting is 0.005 inch (0.13 mm).	If pitting is greater than the permitted serviceable limits, replace the pitch stop spacer.
(3)	Visually examine the pitch stop spacer for hard anodize coverage.	A maximum of 0.5 square inch (322.5 square mm) of missing anodize coating is permitted on external surfaces.	If the amount of missing hard anodize is greater than the permitted serviceable limits, replace the pitch stop spacer.

Component Inspection Criteria
Table 5-1

Inspect	Serviceable Limits	Corrective Action
J. REAR SPRING RETAINER (Item 630)		
(1) Visually examine the rear spring retainer for corrosion product.	Corrosion product is not permitted.	Remove corrosion product, using glass bead cleaning in accordance with the Cleaning chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). If corrosion product cannot be removed, replace the rear spring retainer.
(2) Visually examine the rear spring retainer for pitting and damage.	The maximum permitted depth of damage is 0.005 inch (0.012 mm).	If the pitting or damage is greater than the permitted serviceable limits, replace the rear spring retainer.
(3) Visually examine the rear spring retainer for damage caused by the feathering compression spring.	The maximum permitted depth of damage is 0.005 inch (0.12 mm).	Remove material that is raised above the surface in areas where the depth of damage is less than the permitted serviceable limits. If damage is greater than the permitted serviceable limits, replace the rear spring retainer.
(4) Inspect the OD surface of the rear spring retainer that touches the engine shaft or hub bore for wear.	The minimum OD must be held in accordance with Table 5-2.	If pitting is less than the permitted serviceable limit, replace the rear spring retainer.

Rear Spring Retainer	Minimum OD	
	Inches	Millimeters
A-857	2.227	56.57
A-857-1	2.227	56.57
A-866	1.236	31.39

Rear Spring Retainer Inspection Limits
Table 5-2

Component Inspection Criteria
Table 5-1

	Inspect	Serviceable Limits	Corrective Action
K.	FLANGED SPRING RETAINER (Item 650)		
(1)	Visually examine the flanged spring retainer for corrosion product.	Corrosion product is not permitted.	Remove corrosion product, using glass bead cleaning in accordance with the Cleaning chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). If corrosion product cannot be removed, replace the flanged spring retainer.
(2)	Visually examine the flanged spring retainer for wear, pitting, nicks, gouges, or damage.	The maximum permitted depth of wear, pitting, nicks, gouges, or damage is 0.005 inch (0.12 mm).	If the wear, pitting, nicks, gouges, or damage is greater than the permitted serviceable limits, replace the flanged spring retainer.
(3)	Visually examine the 10-32 threaded holes for damage.	A maximum of 1/2 of one thread total accumulated damage is permitted in each threaded hole.	If the damage is greater than the permitted serviceable limits, replace the flanged spring retainer.
(4)	Measure the ID of the pitch change rod hole.	The maximum permitted ID of the pitch change rod hole is: A-856 front spring retainer is 0.991 inch (25.17 mm). A-871 front spring retainer is 0.741 inch (18.82 mm).	If the ID of the pitch change rod hole is greater than the permitted serviceable limits, replace the flanged spring retainer.
(5)	Penetrant inspect the flanged spring retainer in accordance with the 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.

Component Inspection Criteria
Table 5-1

	Inspect	Serviceable Limits	Corrective Action
L.	FEATHERING COMPRESSION SPRING (Item 610, 660)		
(1)	Visually examine the feathering compression spring for corrosion product.	Corrosion product is not permitted.	Remove corrosion product, using glass bead cleaning in accordance with the Cleaning chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). If corrosion product cannot be removed, replace the feathering compression spring.
(2)	Visually examine the feathering compression spring for pitting.	The maximum permitted depth of pitting is 0.005 inch (0.12 mm).	If the pitting 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.

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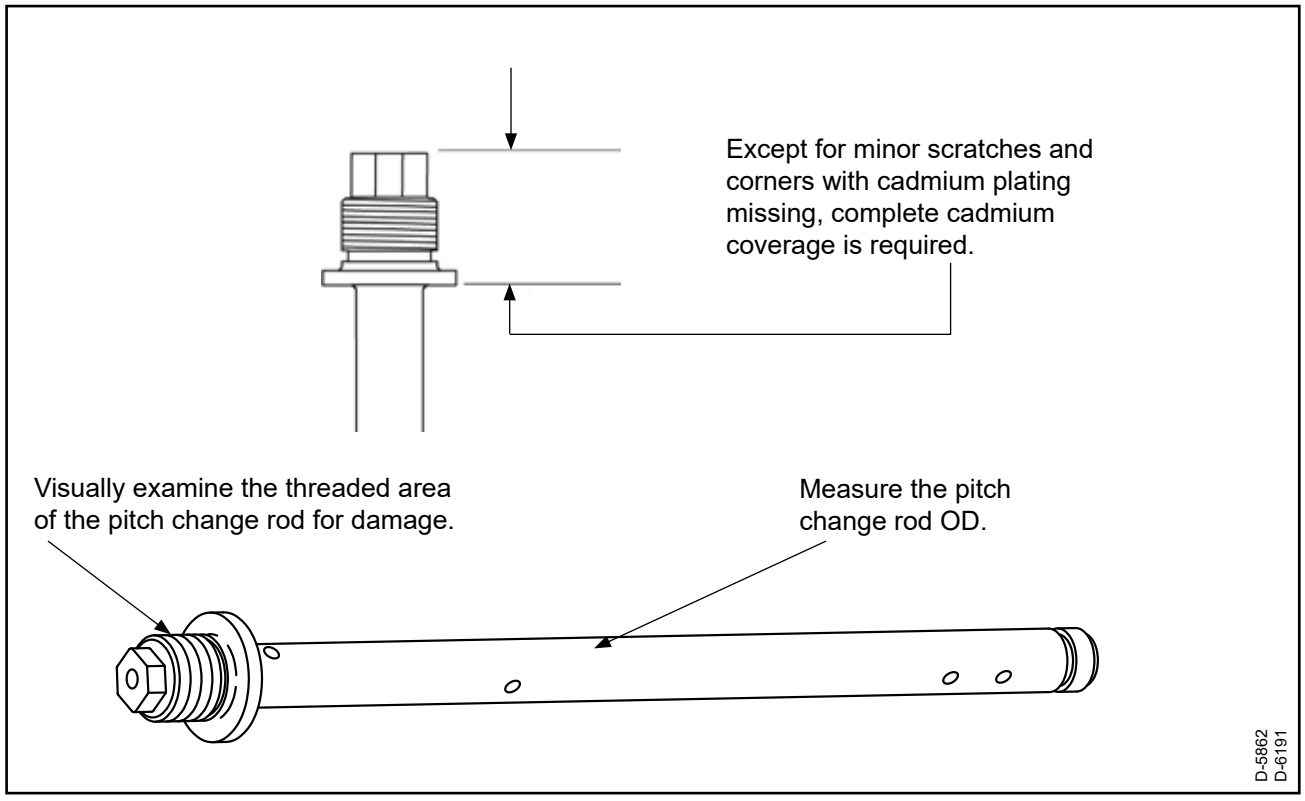
Component Inspection Criteria
Table 5-1

	Inspect	Serviceable Limits	Corrective Action
M.	PITCH CHANGE ROD (Item 670) Refer to Figure 5-6.		
	(1) Visually examine the threaded areas of the pitch change rod for damage.	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 pitch change rod.
	(2) Measure the OD of the pitch change rod.	The minimum permitted OD of the pitch change rod is: B-855A and B-855-2A pitch change rod is 0.981 inches (24.92 mm). D-5682 pitch change rod is 0.731 inches (18.57 mm).	If the OD of the pitch change rod is less than the permitted serviceable limits, replace the pitch change rod.



Pitch Change Rod Inspection
Figure 5-6

Component Inspection Criteria
Table 5-1

	Inspect	Serviceable Limits	Corrective Action
M.	PITCH CHANGE ROD, CONTINUED (Item 670) Refer to Figure 5-6.		
(3)	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). CAUTION: DO NOT REMOVE THE CHROME PLATING BEFORE MAGNETIC PARTICLE INSPECTION.	A relevant indication is not permitted.	If there is a relevant indication, replace the pitch change rod.
(4)	Visually examine the pitch change rod for cadmium plate coverage.	A few random scratches and corners are permitted; otherwise, cadmium plate must completely cover the pitch change rod.	Cadmium replate and bake the pitch change rod in accordance with the Cadmium Replating chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).

Component Inspection Criteria
Table 5-1

	Inspect	Serviceable Limits	Corrective Action
N.	20 SPLINE SHAFT NUT (Item 690)		
(1)	Visually examine the shaft nut for corrosion product.	Corrosion product is not permitted.	Remove corrosion product using glass bead cleaning in accordance with the Cleaning chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). If corrosion product cannot be removed, replace the shaft nut.
(2)	Visually examine the surfaces of the shaft nut, excluding threads, for pitting.	The maximum permitted depth of pitting is 0.005 inch (0.12 mm). Pitting must not interfere with the engine shaft threads.	If pitting is greater than the permitted serviceable limits, replace the shaft nut.
(3)	Visually examine the threads on the shaft nut for pitting.	The maximum permitted depth of pitting is 0.003 inch (0.076 mm). Pitting must not interfere with the engine shaft threads.	If pitting is greater than the permitted serviceable limits, replace the shaft nut.
(4)	Visually examine the threads on the shaft nut for damage.	1/2 of one thread total accumulated damage is permitted. Damage must not interfere with the engines shaft threads.	If damage is greater than the permitted serviceable limits, replace the shaft nut.
(5)	Visually examine the shaft nut for cadmium plate coverage.	A few random scratches are permitted; otherwise, cadmium plate must completely cover the shaft nut.	If the cadmium plate coverage is less than the permitted serviceable limits, replate and bake the shaft nut in accordance with the Cadmium Replating chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).

Component Inspection Criteria
Table 5-1

	Inspect	Serviceable Limits	Corrective Action
N.	20 SPLINE SHAFT NUT, CONTINUED (Item 690)		
	(6) Magnetic particle inspect the shaft nut in accordance with the Magnetic Particle Inspection chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). It is not necessary to remove cadmium plating before magnetic particle inspection.	A relevant indication is not permitted.	If there is a relevant indication, replace the shaft nut.

Component Inspection Criteria
Table 5-1

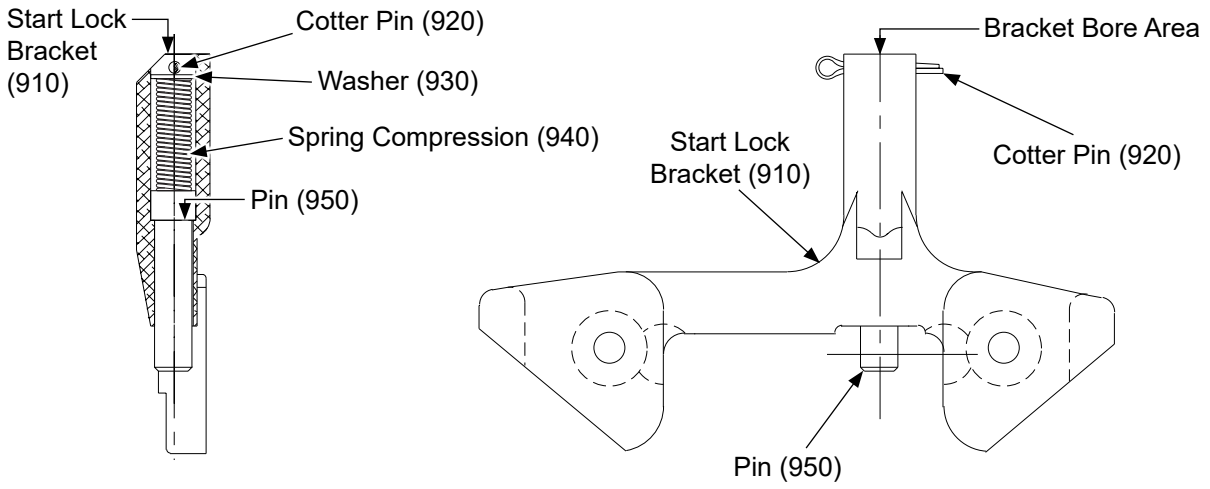
	Inspect	Serviceable Limits	Corrective Action
O.	BALANCE WEIGHT (Item 760)		
(1)	Visually examine the balance weight for corrosion product.	Corrosion product is not permitted.	Remove corrosion product, using glass bead cleaning in accordance with the Cleaning chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). If corrosion product cannot be removed, replace the balance weight.
(2)	Visually examine the balance weight for pitting.	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 a steel (silver color) balance weight: Visually examine for cadmium plate 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).

Component Inspection Criteria
Table 5-1

	Inspect	Serviceable Limits	Corrective Action
P.	HUB PULLER RING (Item 790)		
	(1) Visually examine the hub puller ring for corrosion product.	Corrosion product is not permitted.	Remove corrosion product, using glass bead cleaning in accordance with the Cleaning chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). If corrosion product cannot be removed, replace the hub puller ring.
	(2) Visually examine the hub puller ring for pitting.	The maximum permitted depth of pitting is 0.003 inch (0.07 mm).	If the pitting is deeper than the permitted serviceable limits, replace the hub puller ring.
	(3) Visually examine the hub puller ring for cadmium plating coverage.	A few random scratches are permitted; otherwise, cadmium plating must completely cover the hub puller ring.	If the cadmium plating does not meet the permitted serviceable limits, replate and bake the hub puller ring in accordance with the Cadmium Replating chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).

Component Inspection Criteria
Table 5-1

	Inspect	Serviceable Limits	Corrective Action
Q.	START LOCK BRACKET (Item 910) Refer to Figure 5-7.		
	(1) Visually examine the start lock bracket for corrosion product.	Corrosion product 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 corrosion product cannot be removed, replace the start lock bracket.



830-5 Start Lock Assembly Shown

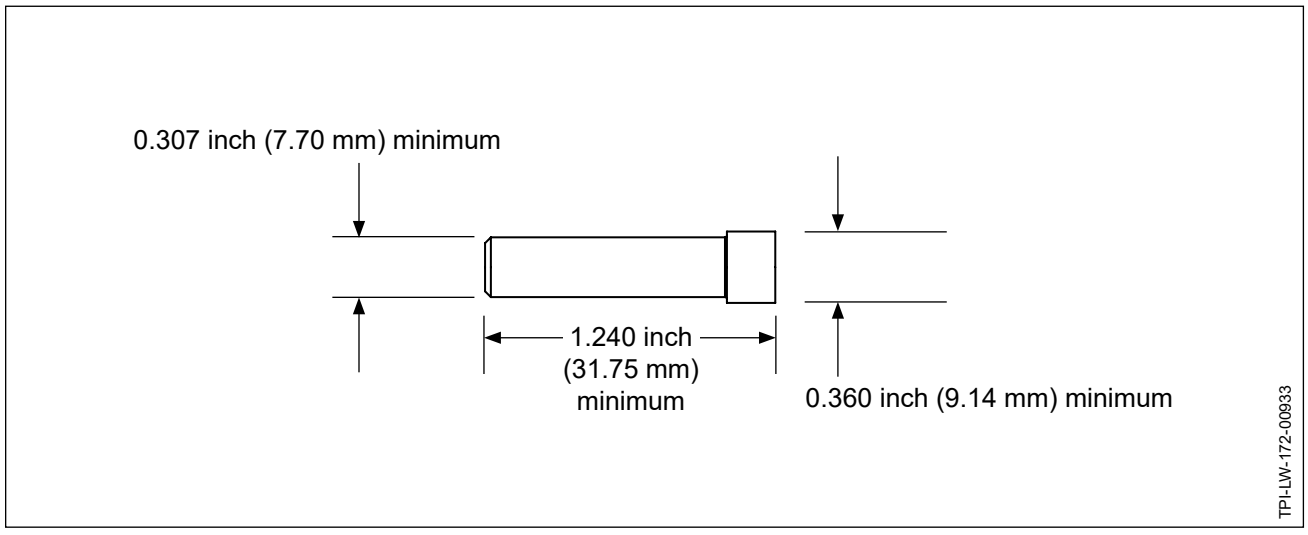
Start Lock Components
Figure 5-7

Component Inspection Criteria
Table 5-1

	Inspect	Serviceable Limits	Corrective Action
Q.	START LOCK BRACKET, CONTINUED (Item 910) Refer to Figure 5-7.		
(2)	Visually examine the start lock bracket for damage.	Damage or raised material is not permitted.	Using an abrasive pad CM47 or equivalent, polish the damaged area and chemical conversion coat in accordance with the Chromic Acid Anodizing chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). All of the damage must be removed. Repairs up to 0.005 inch (0.12 mm) deep are permitted. If the damage cannot be repaired, replace the start lock bracket.
(3)	Penetrant inspect the start lock bracket 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 start lock bracket.

Component Inspection Criteria
Table 5-1

	Inspect	Serviceable Limits	Corrective Action
R.	START LOCK PIN (Item 950) Refer to Figure 5-8.		
(1)	Visually examine the start lock pin for corrosion product.	Corrosion product is not permitted.	Remove corrosion product using glass bead cleaning in accordance with the Cleaning chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). If corrosion product cannot be removed, replace the start lock pin.
(2)	Measure the start lock pin.	For the minimum permitted measurement limits, refer to Figure 5-8.	If a measurement is less than the permitted serviceable limits, replace the start lock pin.
(3)	Visually examine the start lock pin for damage.	Damage or raised material is not permitted.	Using an abrasive pad CM47 or equivalent, remove all damage. Repairs up to 0.005 inch (0.12 mm) deep are permitted. If damage cannot be removed, replace the start lock pin.



Start Lock Pin
Figure 5-8

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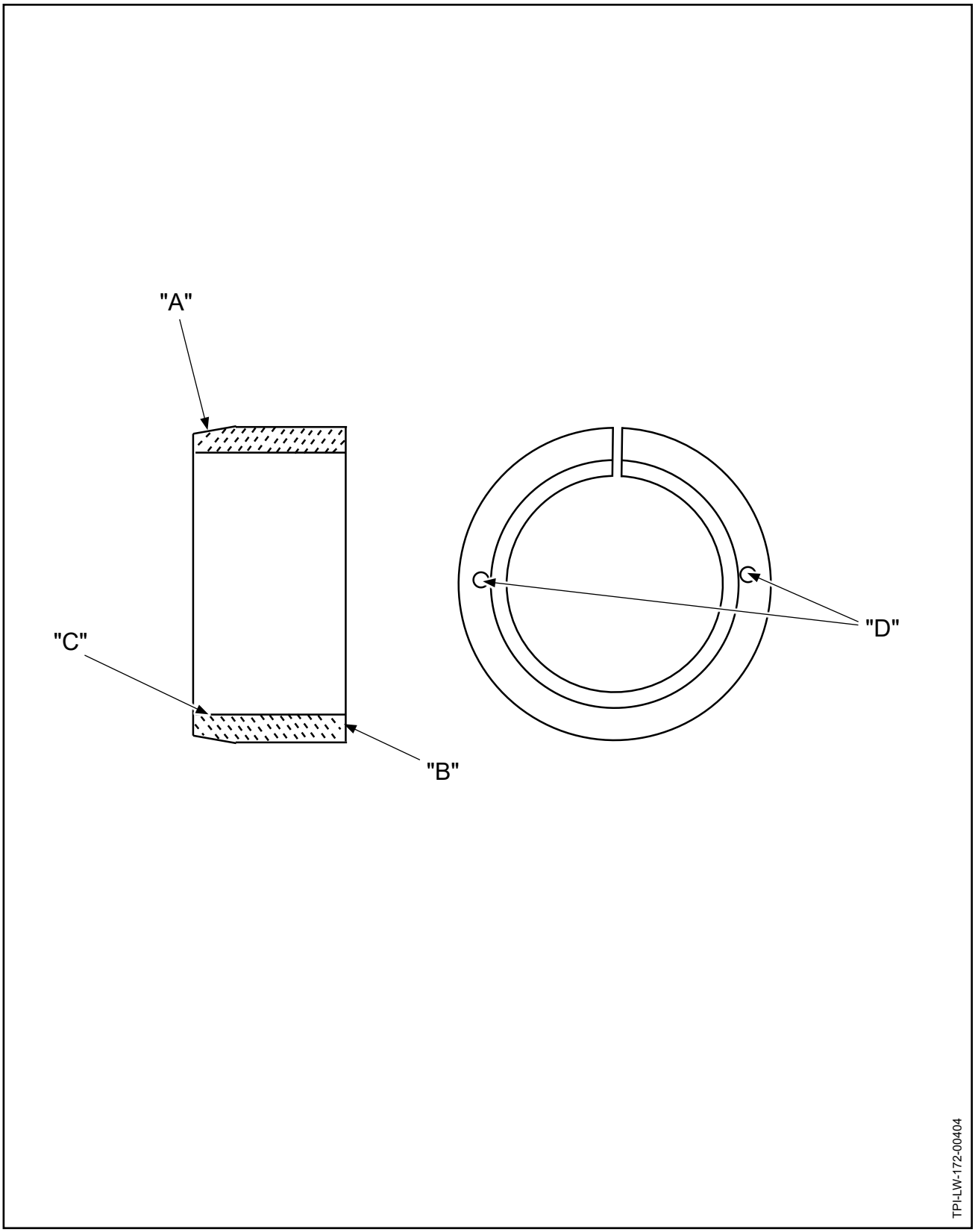


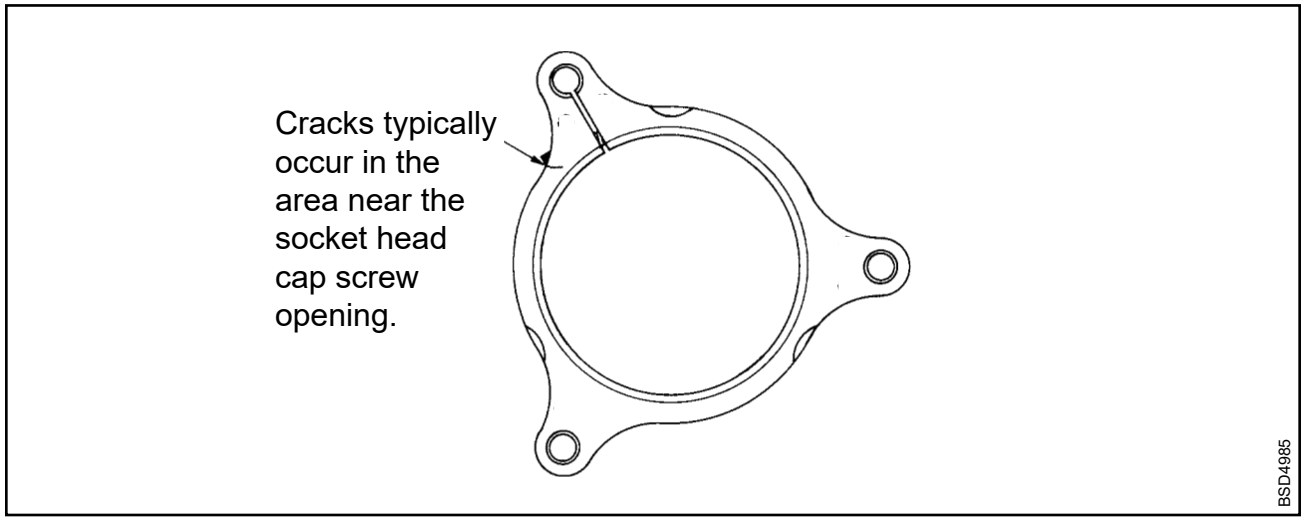
20 Spline Rear Mounting Cone Inspection
Figure 5-9

Component Inspection Criteria
Table 5-1

	Inspect	Serviceable Limits	Corrective Action
S.	20 SPLINE REAR MOUNTING CONE (Item 1030) Refer to Figure 5-9.		
(1)	Visually examine the OD taper surface "A" and surface "B" of the 20 spline rear mounting cone for surface finish.	Surface finish must be 63 micro finish or smoother.	If the surface finish does not meet the permitted serviceable limits, replace the 20 spline rear mounting cone.
(2)	Visually examine the OD of taper surface "A" and surface "B" of the 20 spline rear mounting cone for damage.	Except for light scratches, damage is not permitted.	If the damage is greater than the permitted serviceable limits, replace the 20 spline rear mounting cone.
(3)	Visually examine the ID surface "C" for damage.	Except for light scratches, damage is not permitted.	If the damage is greater than the permitted serviceable limits, replace the 20 spline rear mounting cone.
(4)	Visually examine pin holes “D” for damage or unwanted material.	Damage or unwanted material in either hole is not permitted.	If there is damage or unwanted material in either hole, replace the 20 spline rear mounting cone.
(5)	Visually examine pin holes “D” for broken pins remaining in the holes.	A broken pin in either hole is not permitted.	If there is a broken pin in either hole, replace the 20 spline rear mounting cone.
(6)	Visually examine pin holes "D" for elongated holes.	An elongated hole is not permitted.	If a pin hole "D" is elongated, replace the 20 spline rear mounting cone.
(7)	Visually examine pin holes "D" for raised material surrounding the holes.	Raised material surrounding the hole is not permitted.	Using an abrasive pad CM47 or equivalent, locally polish the area surrounding the pin hole to remove raised material. The surface finish must be equal to the undamaged surface area adjacent to the repaired area.

Component Inspection Criteria
Table 5-1

	Inspect	Serviceable Limits	Corrective Action
T.	GUIDE COLLAR (Item 1070) Refer to Figure 5-10.		
	(1) Visually examine the guide collar for nicks, gouges, or other damage.	The maximum permitted depth of nicks, gouges, or other damage is 0.020 inch (0.51 mm).	Using an abrasive pad CM47 or equivalent, polish the nick, gouge, or other damaged area. Apply an Alodine coating in accordance with the Chromic Acid Anodizing chapter of Hartzell Standard Propeller Inc. Practices Manual 202A (61-01-02). If the nick, gouge, or other damage is greater than the permitted serviceable limits, replace the guide collar.
	(2) Penetrant inspect the guide collar in accordance with the Penetrant Inspection chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). It is not necessary to remove the anodized coating before dye penetrant inspection.	A relevant indication is not permitted.	If there is a relevant indication, replace the guide collar.

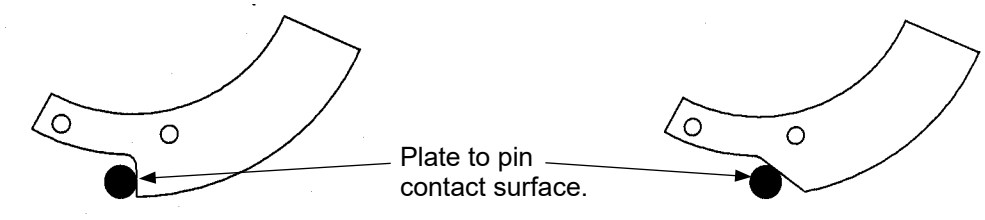


Guide Collar
Figure 5-10

Component Inspection Criteria
Table 5-1

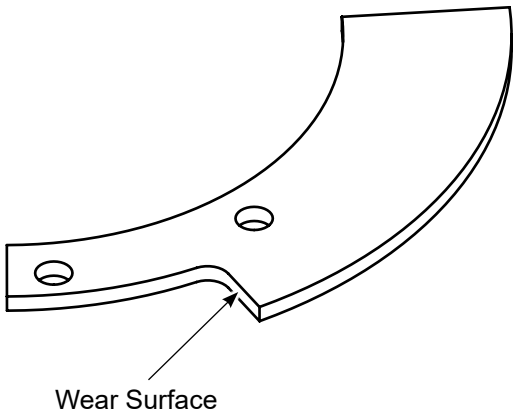
	Inspect	Serviceable Limits	Corrective Action
U.	PLASTIC BUSHING (Item 1090)		
(1)	Measure the ID of each guide collar plastic bushing.	The maximum ID of the plastic bushing is 0.513 inches (13.03 mm).	If the ID of the plastic bushing is greater than the permitted serviceable limits, replace the guide collar plastic bushing in accordance with the Special Adhesive and Bonding Procedures chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).
		Oval shaped wear of a guide collar plastic bushing greater than 0.008 inch (0.20 mm) is not permitted.	If the guide collar plastic bushing ID is worn to an oval shape greater than the permitted serviceable limits, replace the guide collar plastic bushing. Refer to the Special Adhesive and Bonding Procedures chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).

Filing start lock plates is permitted to achieve high pitch. If filing is performed, the notched area must contact the pin squarely. If the start lock plate has been modified and does not permit square contact, the start lock plate must be replaced.



This contact area of this start lock plate has been modified to allow the start lock pin to squarely contact the start lock plate.

This is an example of a modified start lock plate that is unacceptable. The start lock plate does not squarely contact the start lock plate. The start lock plate must be replaced.



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Start Lock Plate
Figure 5-11

Component Inspection Criteria
Table 5-1

	Inspect	Serviceable Limits	Corrective Action
V.	START LOCK PLATE (Item 1400) Refer to Figure 5-11.		
(1)	Visually examine the start lock plate for corrosion product.	Corrosion product is not permitted.	Remove corrosion product, using glass bead cleaning in accordance with the Cleaning chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02). If corrosion product cannot be removed, replace the start lock plate.
(2)	Visually examine the start lock plate for pitting.	The maximum permitted depth of pitting is 0.005 inch (0.12 mm).	If the pitting is greater than the permitted serviceable limits, replace the start lock plate.
(3)	Visually examine the start lock plate for scratches.	The maximum permitted depth of a scratch is 0.005 inch (0.12 mm).	If the scratch is greater than the permitted serviceable limits, replace the start lock plate.
(4)	Visually examine for wear on the surface that contacts the start lock pin.	The maximum permitted wear depth is 0.020 inch (0.50 mm).	If the start lock angle can still be obtained, remove wear depth by filing the notched area; otherwise, replace the start lock plate.
(5)	Visually examine the start lock plate for cadmium plating coverage.	A few random scratches are permitted; otherwise, cadmium plating must completely cover the start lock plate.	Replate and bake the start lock plate in accordance with the Cadmium Replating chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).

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REPAIR - CONTENTS

LIST OF FIGURES

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WARNING 1: DO NOT ATTEMPT IN THE FIELD ANY REPAIR, REPLACEMENT, REPLATING, RE-ANODIZING, OR RE-SHOT PEENING PROCEDURE NOT SPECIFICALLY AUTHORIZED BY HARTZELL PROPELLER 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 (Rev. 2)

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 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 (Rev. 3)

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

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

B. Hubs

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

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 Blade Overhaul Manual 135F (61-13-35).

D. Blade Clamps

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

E. Spinner Assemblies

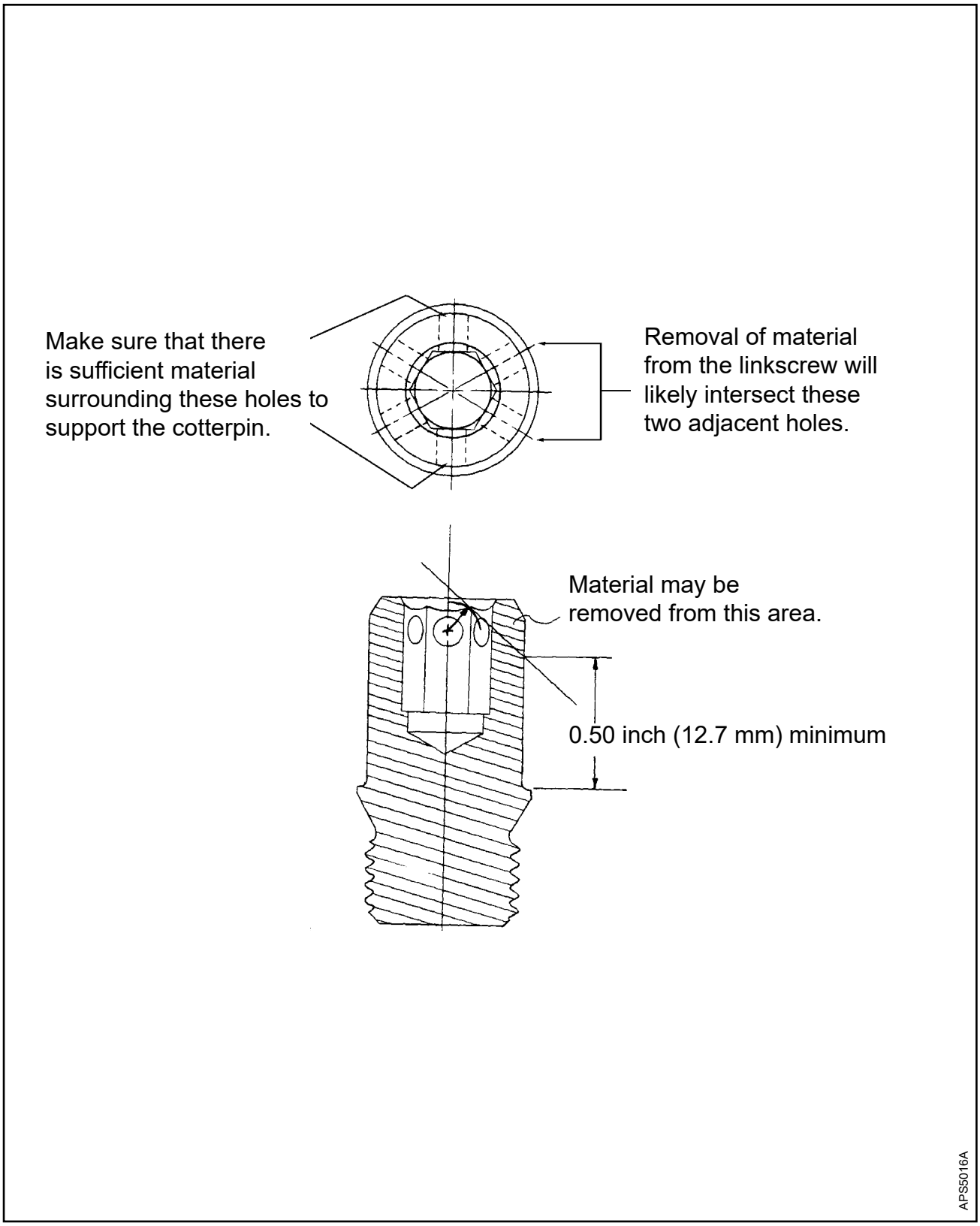
(1) Metal Spinners: Refer to Hartzell Propeller Inc. Metal Spinner Maintenance Manual 127 (61-16-27).

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

F. 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).



Linkscrew Repair Limits for Hub Clearance on HC-(2,3)(V, MV) Propellers
Figure 6-1

3. Specific Repair Requirements

A. Cylinder Repair

(1) For information applicable to the inspection and repair of cylinders, refer to the Check chapter of this manual.

B. Piston Repair

(1) For piston repair and bushing replacement, refer to the Standard Repairs and Instructions chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).

C. Guide Collar Repair

(1) For guide collar bushing removal and replacement, refer to the Special Adhesive and Bonding chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).

D. Repair of A-304 Linkscrew on HC-A(2,3)(V, MV) Propeller Assemblies

(1) When adjusting the pitch range of some propeller assemblies, the linkscrew may touch the hub. When this happens, the full blade angle range cannot be achieved. This condition can be eliminated by grinding the linkscrew to remove material and allow clearance.

(a) Remove only enough material from the linkscrew to permit clearance with the hub. Refer to Figure 6-1.

NOTE: Removal of material from the linkscrew will likely intersect the two adjacent holes on that side of the linkscrew.

(b) Make sure that there is sufficient material surrounding the remaining, unaffected holes in the linkscrew to support the safety cotter pin.

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ASSEMBLY - CONTENTS

ASSEMBLY - CONTENTS, CONTINUED

LIST OF FIGURES

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1. General (Rev. 6)

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 grease 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 Blade Overhaul 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).

F. Blade Clamp Assembly

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

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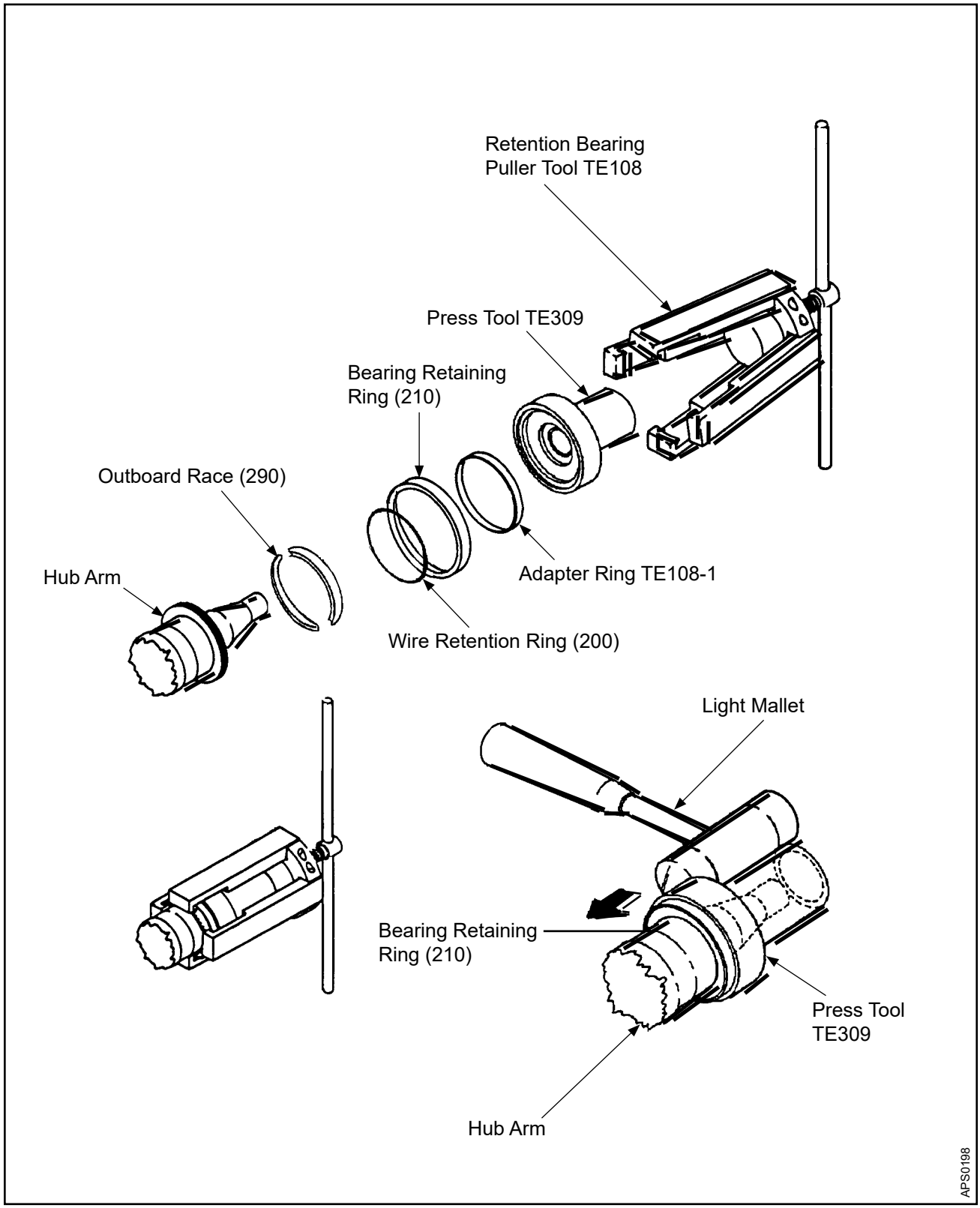


Hub Arm Build-Up
Figure 7-1

2. Models in the HC-A(2, 3)(V, MV)(F,K,L) -2 Series

A. Hub Unit Assembly

(1) Follow the hub assembly procedure in the Steel Hub Overhaul chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).

B. Blade Mounting Parts Assembly

CAUTION: RACES (220, 290) MUST BE MATCHED SETS. RACE (220) IS THE INBOARD RACE AND RACE (290) IS THE OUTBOARD RACE.

(1) Attach the hub unit (700) on the rotatable fixture of the assembly table.

CAUTION: MAKE SURE THE INTERNAL RECESS OF THE BEARING RETAINING RING (210) FACES OUTBOARD WHEN THE BEARING RETAINING RING IS SLIPPED OVER THE BLADE ARM FLANGE OF THE HUB UNIT (700).

(2) Using a light mallet and press tool TE309, or equivalent, move a bearing retaining ring (210) onto a blade arm flange of the hub unit (700). Refer to Figure 7-1.

NOTE: Move the bearing retaining ring (210) far enough onto the blade arm flange that the bearing retaining ring forms a narrow channel on the inboard surface of the flange.

(3) Using grease CM12, lightly grease the inboard surface of each blade arm flange.

(4) Put a matched set of outboard races (290) in position over one hub arm.

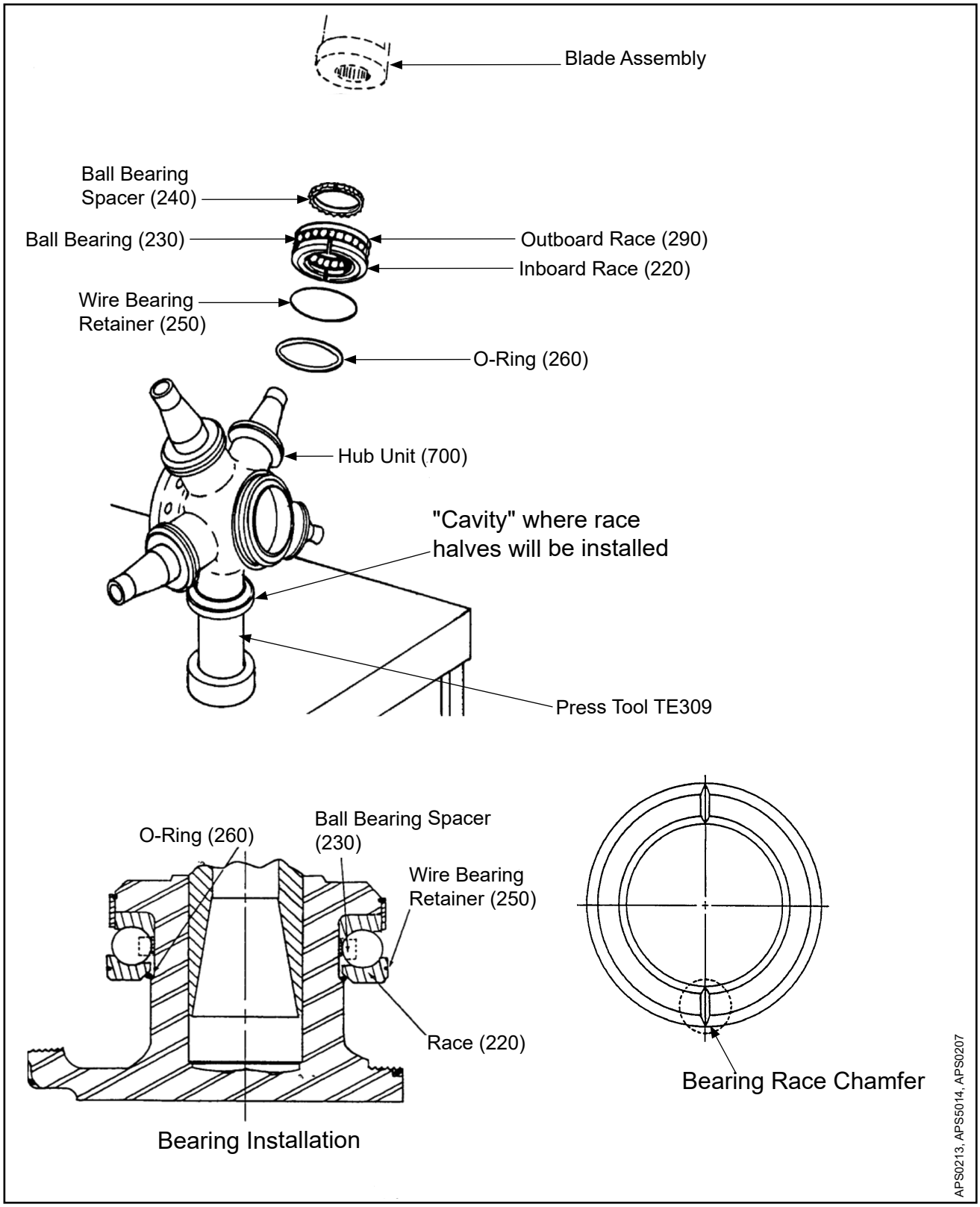
NOTE: The break line for the outboard race (290) should be perpendicular to the table top.

(5) Using press tool TE309 and retention bearing puller TE108 or equivalents, push the bearing retaining ring (210) far enough onto the outboard race (290) to permit the insertion of the wire retention ring (200) into the groove in the hub blade arm flange. Refer to Figure 7-1.

(6) Install the wire retention ring (200) into the groove in the blade arm flange. Refer to Figure 7-1.

(7) Using press tool TE309 and retention bearing puller TE108 or equivalents, pull the bearing retaining ring (210) outboard far enough to permit the wire retention ring (200) and the bearing retaining ring to touch each other. The wire retention ring fits in the recess of the bearing retaining ring. Refer to Figure 7-1.

(a) Make sure the wire retention ring is fully enclosed to make sure it is not pinched.



Blade and Flange Mounting Parts
Figure 7-2

(8) Lubricate the blade O-ring (260) with grease CM12 or reciprocating engine oil.

(9) Move the blade O-ring over the blade arm flange of the hub unit (700) to a location inboard of the thrust bearing. Keep it there for use later in the reassembly.

(10) Repeat this procedure for the remaining hub arms.

(11) Remove the hub unit (700) from the rotatable fixture on the assembly table.

(12) Using press tool TE309 or equivalent, hold the hub unit vertical as shown in Figure 7-2.

NOTE: The arm of the hub unit (700) being fitted with outboard races (290) must be face down so that the hub flange and bearing retaining ring (210) form a "cavity" that will hold the bearing balls (230).

CAUTION 1: THE BREAK LINE OF THE INBOARD RACE (220) MUST BE AT A RIGHT ANGLE TO THE BREAK LINE OF THE BLADE CLAMP HALVES (310).

CAUTION 2: ANY GAP BETWEEN THE HALVES OF RACES (220, 290) SHOULD BE NO GREATER THAN 0.001 INCH (0.0254 MM).

CAUTION 3: ALL BEARING BALLS (230) INSTALLED IN A SINGLE BEARING MUST BE OF THE SAME GAUGE. BEARING BALLS SUPPLIED BY HARTZELL PROPELLER INC. ARE OF THE SAME GAUGE.

(13) Install the ball spacer (240) and the necessary number of bearing balls (230) onto the outboard race (290).

(14) Apply a small amount of RTV CM93 to the chamfered edges (break point) of the matched set of inboard races (220).

(15) Remove any unwanted sealant that could extrude into the bearing area when the race halves are joined.

CAUTION: THE OPENING OF THE WIRE BEARING RETAINER (250) MUST BE AT A RIGHT ANGLE TO THE PARTING LINE OF THE INBOARD RACE (220).

(16) Put the inboard race halves (220) around one blade arm of the hub unit (700) and install the wire bearing retainer (250) to hold the halves in position.

CAUTION: THE USE OF TOO MUCH RTV CM93 COULD CAUSE UNEVEN SEATING BETWEEN THE CLAMP ASSEMBLY (300) AND RACE (220).

(17) Apply a small bead of RTV CM93 to inboard race (220) at the break point in order to evenly fill the void in the chamfered area of the race.

(18) Move the O-ring (260) outboard against the inboard race (220).

(19) Wrap wide masking tape around the outside diameter of the bearing assembly to hold the parts in position.

(20) Repeat this procedure for the remaining blade arms.

C. Assembling Clamp and Link Arms

(1) For clamp assembly procedures, refer to the Blade Clamp Overhaul chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).

(2) For all models, refer to the Hartzell Propeller Inc. Application Guide Manual 159 (61-02-59) for information on the correct counterweight slugs and mounting hardware.

CAUTION: A LINK ARM (100) CANNOT BE INSTALLED AFTER THE CLAMP (300) HAS BEEN INSTALLED ON THE HUB.

(3) After each clamp (300) is assembled:

(a) Install the linkscrew sleeve (110) onto the linkscrew (390).

(b) Install the link arm bushing (385) onto the linkscrew (390), if applicable.

(c) Install the link arm (100) onto the linkscrew (390).

NOTE: The raised shoulder on the link arm (100) must face the clamp.

(d) Push the cotter pin (280) through the hole in the end of the linkscrew (390) and open the cotter pin to secure the link arm (100) to the clamp assembly (700).

NOTE: The link arm (100) should move freely on the linkscrew (390).

(e) Attach a start lock plate (1400) on the inboard side of each lower clamp half (310) with fasteners (1410), as applicable.

(f) Repeat this procedure for the remaining clamp assemblies (300).

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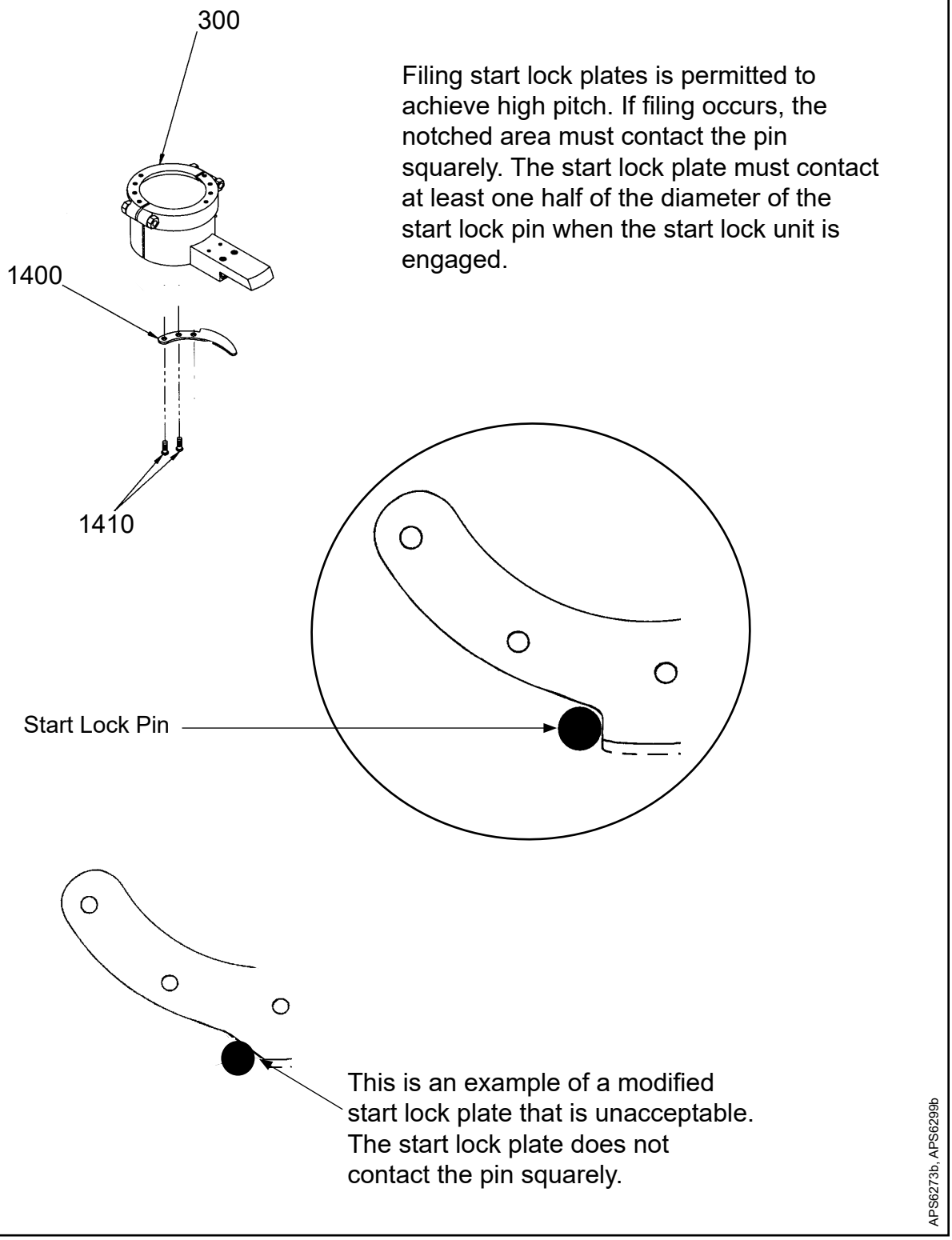


Start Lock Plate Modifications
Figure 7-3

D. Start Lock Assembly and Installation

CAUTION 1: THE PROPELLER MUST ACTUATE WITHOUT INTERFERENCE FROM THE START LOCK PLATE (1400).

CAUTION 2: THE START LOCK PLATE (1400) MUST TOUCH AT LEAST ONE HALF OF THE DIAMETER OF THE START LOCK PIN (950) WHEN THE START LOCK ASSEMBLY (900) IS ENGAGED.

(1) Put the start lock pin (950) into the start lock bracket (910).

(2) Put the compression spring (940) into the start lock bracket (910) against the start lock pin (950).

(3) Compress the compression spring (940) with the washer (930).

(4) Put the cotter pin (920) into the start lock bracket (910) to keep the washer (930), compression spring (940), and start lock pin (950) in the start lock bracket.

CAUTION: MAKE SURE THE COTTER PIN (920) WILL NOT INTERFERE WITH THE START LOCK BRACKET (910) AFTER IT IS INSTALLED.

(5) Open the cotter pin (920) to keep the assembly in position.

(6) Attach the start lock assemblies (900) to the hub unit flange.

(7) Examine for clearance between each clamp assembly (300) and start lock assembly (900).

(a) There must be clearance between the OD of the start lock plate (1400) and the spinner mounting plate or bulkhead.

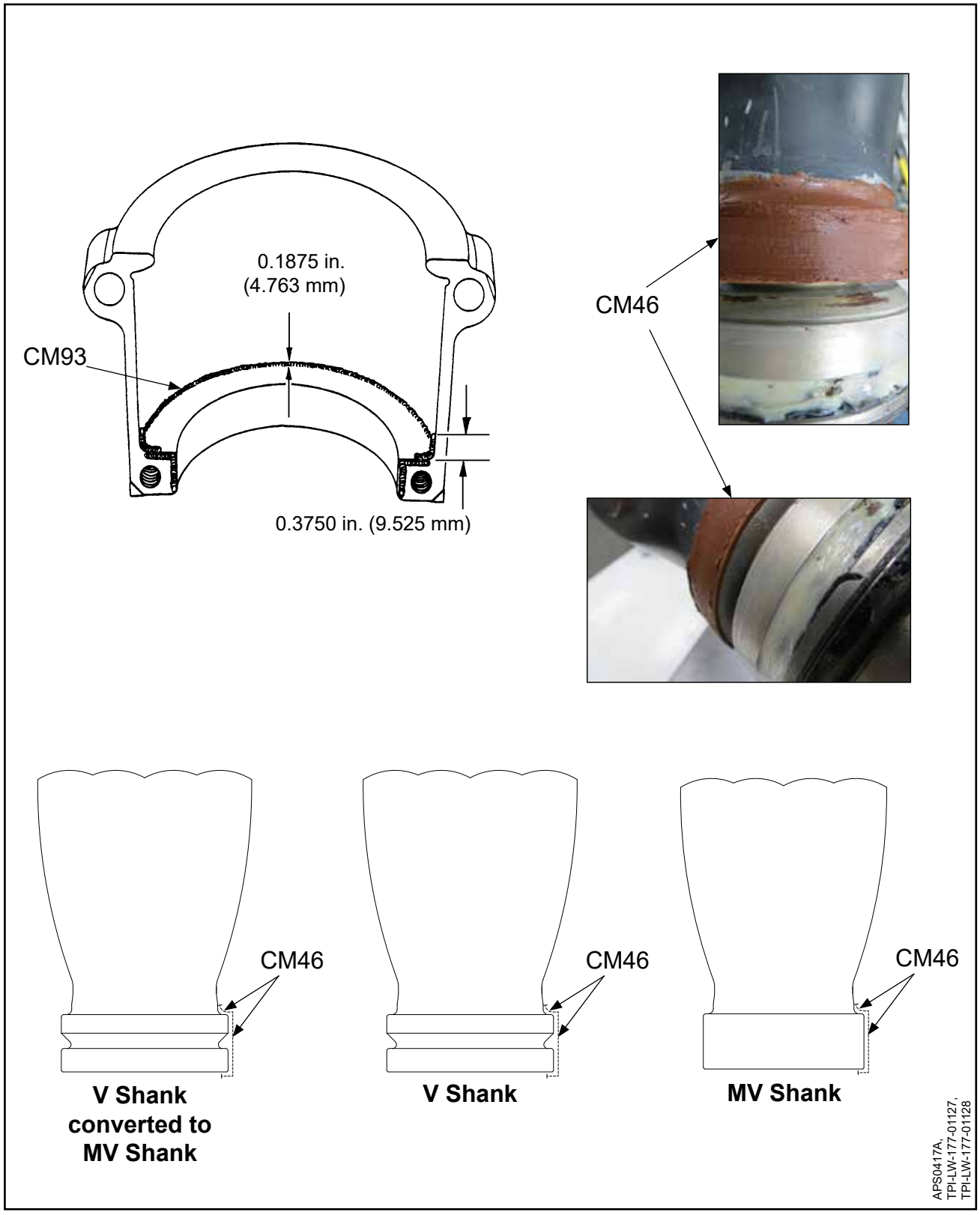
(b) There must be clearance between the start lock bracket (910) and the head of the inboard clamp screw (440).

(c) Washers can be installed between the start lock plate (1400) and clamp assembly (300) to move the start lock plate and make the interface better with the start lock pin (950).

(8) To relieve interference, local polishing on the start lock bracket (910) to a maximum depth of 0.020 inch (0.51 mm) is permitted. Refer to Figure 7-3.

(9) Remove all polish marks from the repaired surface and apply chemical conversion coating as specified in the Chromic Acid Anodizing chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).

(10) Retract the start lock pins (950) for assembly, and hold them in position with a wire inserted in the hole in the start lock bracket (910).



Application of Sealant
Figure 7-4

E. Installing Blades and Clamps

(1) With the hub assembly (700) mounted on the rotatable fixture of the assembly table, follow the procedure for checking blade track found in this chapter.

(2) Check blade track

CAUTION: BLADE HEIGHTS AT THE TIP SHOULD NOT VARY MORE THAN 0.125 INCH (3.18 MM).

(a) Turn the propeller on the rotatable fixture, and check the height at the tip of each blade using a gauge and adjustable pointer.

(b) If all blades do not track:

1 Make sure there is no debris between the rotatable fixture flange and the propeller hub flange.

2 A blade or blades not in tolerance with the majority must be removed and reinspected for blade face alignment in accordance with Hartzell Propeller Inc. Aluminum Blade Overhaul Manual 133C (61-13-33).

WARNING: AIR TRAPPED IN THE LUBRICANT CAN AFFECT PROPELLER BALANCE AFTER RUN-UP.

(3) Stand blade number one in vertical position (base up, tip down) and fill the pilot tube cavity with grease CM12 to the top level of the bottom inboard bearing.

(4) Move the blade onto the pilot tube (720). Push the blade toward the center of the hub until the butt of the blade shank touches the face of the blade arm.

NOTE: A small amount of grease will push out around the pilot tube if the blade has been lubricated correctly.

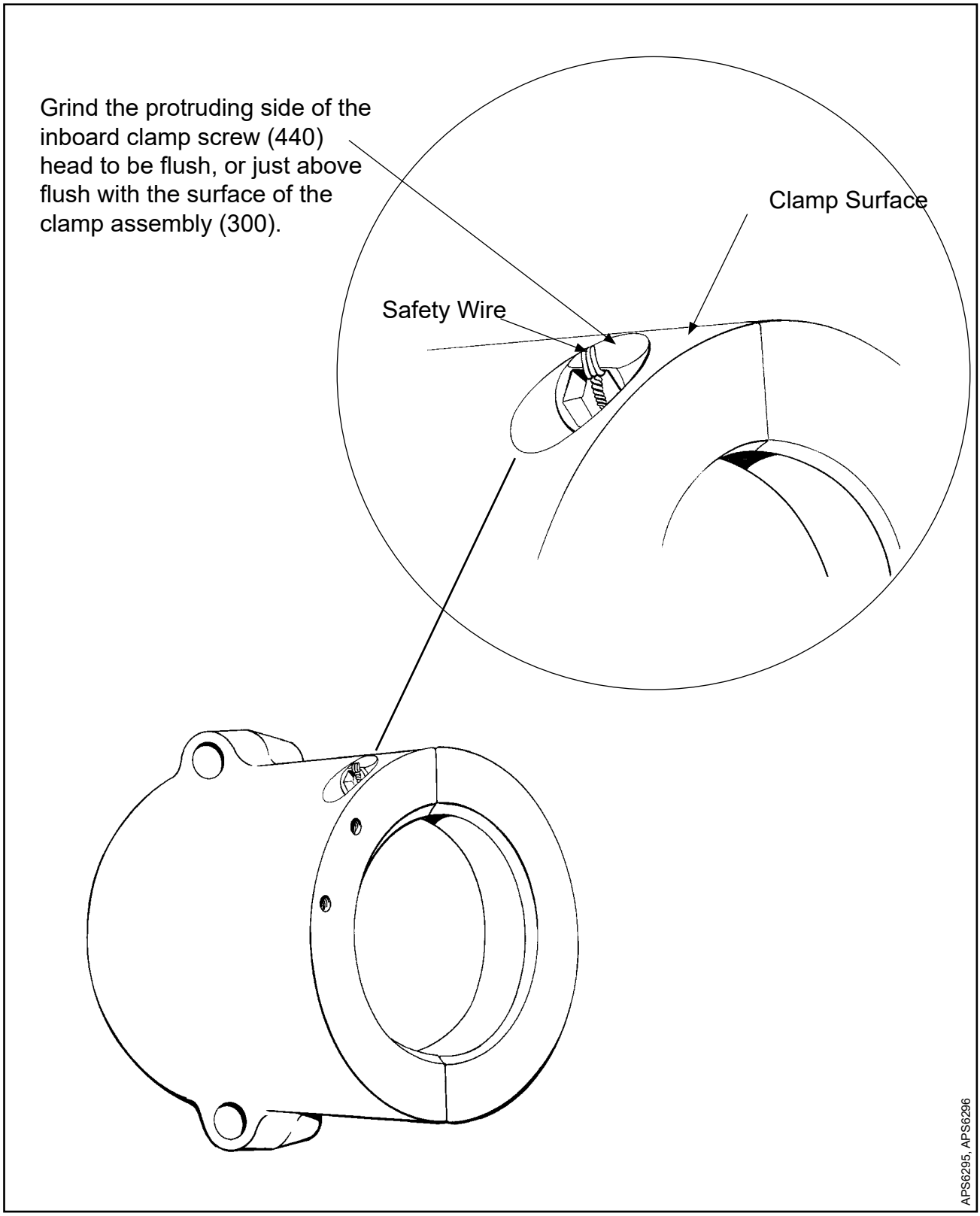
(5) Repeat this procedure for the remaining blades.

CAUTION 1: HARDENING GASKET SEALANT CM46 MUST BE USED ON THE SHOULDER RADIUS OF THE BLADE SHANK, THE OUTER DIAMETER OF THE BLADE SHANK, AND THE OUTER CORNER OF THE BLADE BUTT AS SHOWN IN FIGURE 7-4.

CAUTION 2: DO NOT APPLY GASKET COMPOUND CM46 IF THE PROPELLER WILL BE DISASSEMBLED FOR SHIPMENT.

(6) Using an acid brush or finger, optionally wearing non-powdered latex gloves, apply a smooth even layer of gasket compound CM46 on the shoulder radius of the blade shank, the outer diameter of the blade shank, and the outer corner of the blade butt as shown in Figure 7-4.

NOTE: Before installing a clamp assembly (700), make sure that the shoulder radius of the blade shank, the outer diameter of the blade shank, and the outside corner of the blade butt are completely covered by a smooth even layer of CM46 as shown in Figure 7-4.



Preventing Contact Between the Inboard Clamp Screw Head and the Start Lock Bracket
Figure 7-5

(7) Apply a bead of RTV CM93 approximately 0.125 inch (3.175) wide and 0.06 inch (1.524 mm) thick to both clamp halves (310) on the mating surfaces and in the inboard bearing radius as shown in Figure 7-4.

(8) Remove the masking tape used to temporarily hold the bearing assembly together.

CAUTION: THE PARTING LINES OF THE CLAMP HALVES (310) MUST BE PERPENDICULAR TO THE PARTING LINE OF THE INBOARD RACE (220).

(9) Put the counterweighted clamp half (310) on the blade and bearing assembly. Join the corresponding lower clamp half (310), enclosing the bearing assembly.

(10) Put a clamp gasket (430) between the parting surfaces of the clamp assembly.

CAUTION 1: A 0.06-INCH (1.59 mm) MAXIMUM OF GASKET MATERIAL MUST BE EVENLY EXPOSED THROUGH THE PARTING LINE ON EACH SIDE OF THE CLAMP ASSEMBLY (300). THE GASKET (430) MUST BE TRIMMED AS NECESSARY TO PROVIDE METAL-TO-METAL CONTACT WHERE THE CLAMP LUGS MEET.

CAUTION 2: DO NOT TORQUE THE OUTBOARD CLAMP BOLTS (460) AT THIS STEP OF ASSEMBLY.

(11) Install the outboard clamp bolts (460).

NOTE: This step helps align the clamp gasket (430).

(12) Install washers (410) and self locking nuts (420).

(a) Hand-tighten the self locking nuts (420).

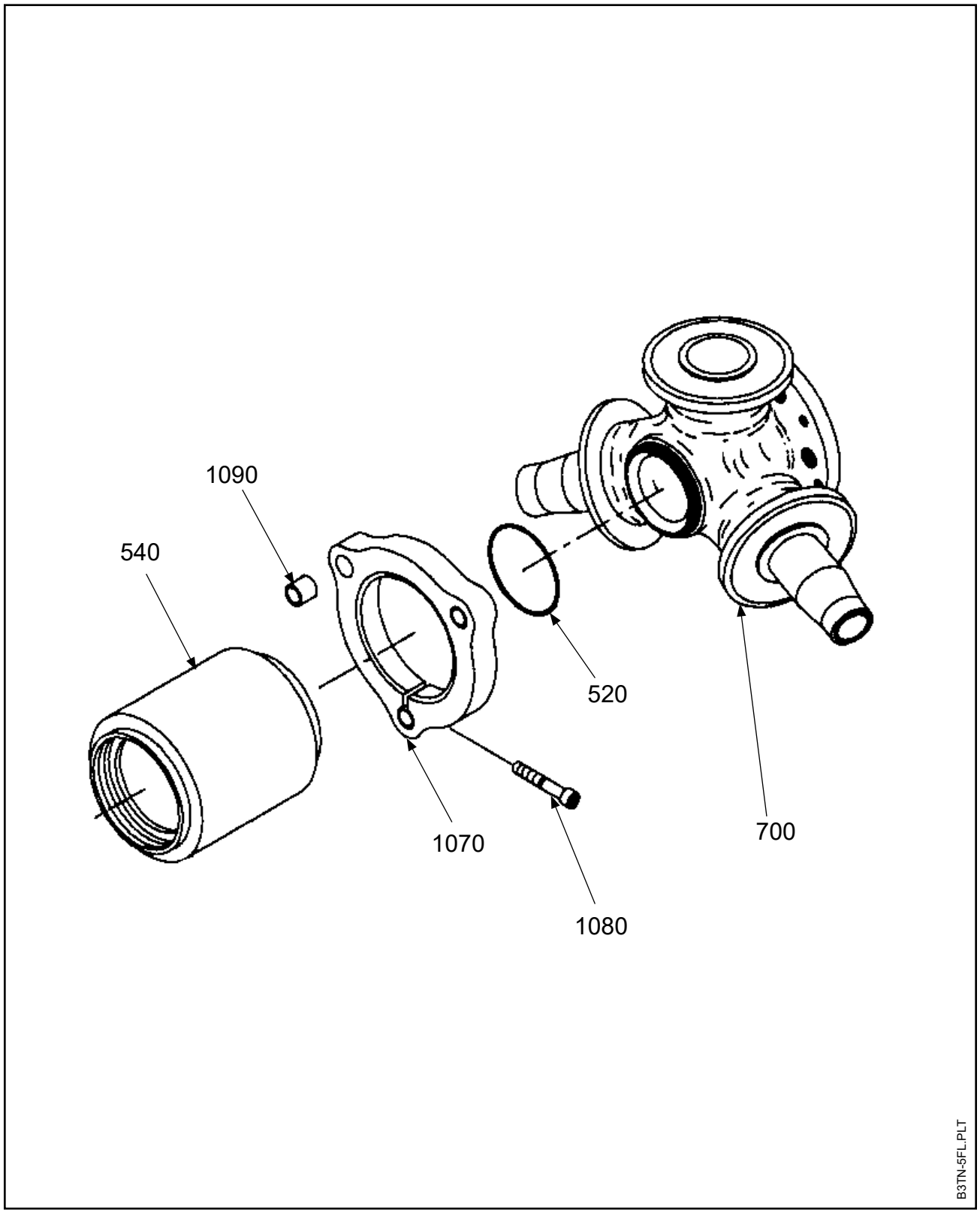
(13) Install the inboard clamp screws (440).

CAUTION 1: DO NOT EXCEED THE RECOMMENDED TORQUE FOR THE INBOARD CLAMP SCREWS (440). REFER TO TABLE 8-1, "TORQUE VALUES", IN THE FITS AND CLEARANCES CHAPTER OF THIS MANUAL.

CAUTION 2: INBOARD CLAMP SCREWS (440) MUST BE TORQUED IN THE SEQUENCE SPECIFIED.

(14) Torque the inboard clamp screws (440) in 10 Ft-Lb (13 N•m) increments (20, 30, etc.) alternating between the inboard clamp screws at each increment.

(a) Torque the inboard clamp screws in accordance with Table 8-1, "Torque Values", in the Fits and Clearances chapter of this manual.



Guide Collar and Cylinder
Figure 7-6

CAUTION: DO NOT CONTACT THE CLAMP ASSEMBLY (300) WHILE DRILLING THE INBOARD CLAMP SCREWS (440).

(15) With a #42 size bit, drill the head of each inboard clamp screw (440).

(16) Safety each inboard clamp screw (440) with a cotter pin (450) so that the cotter pin touches the clamp half (310) and prevents the inboard clamp screw from backing out of the clamp assembly (300). Refer to Figure 7-5.

(a) If an installed cotter pin (450) causes interference, three loops of safety wire CM131 can be used to safety the inboard clamp screw (440).

(17) Attach a start lock plate (1400) on the inboard side of each lower clamp half (310) with fasteners (1410), as applicable.

(a) There must be clearance between the OD of the start lock plate (1400) and the spinner mounting plate or bulkhead.

(b) There must be clearance between the start lock bracket (910) and the head of the inboard clamp screw (440).

(c) Washers can be installed between the start lock plate (1400) and clamp assembly (300) to move the start lock plate and make the interface with the start lock pin (950) better.

(18) Safety the start lock plate fasteners (1410) with safety wire CM131.

(19) Repeat this procedure for the remaining blades and clamps.

F. Installing the Guide Collar and Cylinder
Refer to Figure 7-6.

NOTE: Guide collar units (1060) are installed on three-blade propellers in this series, but not on two-blade propellers. When assembling two blade propellers, disregard instructions concerning guide collar units.

(1) Clean the threads on the hub unit (700) and cylinder (540).

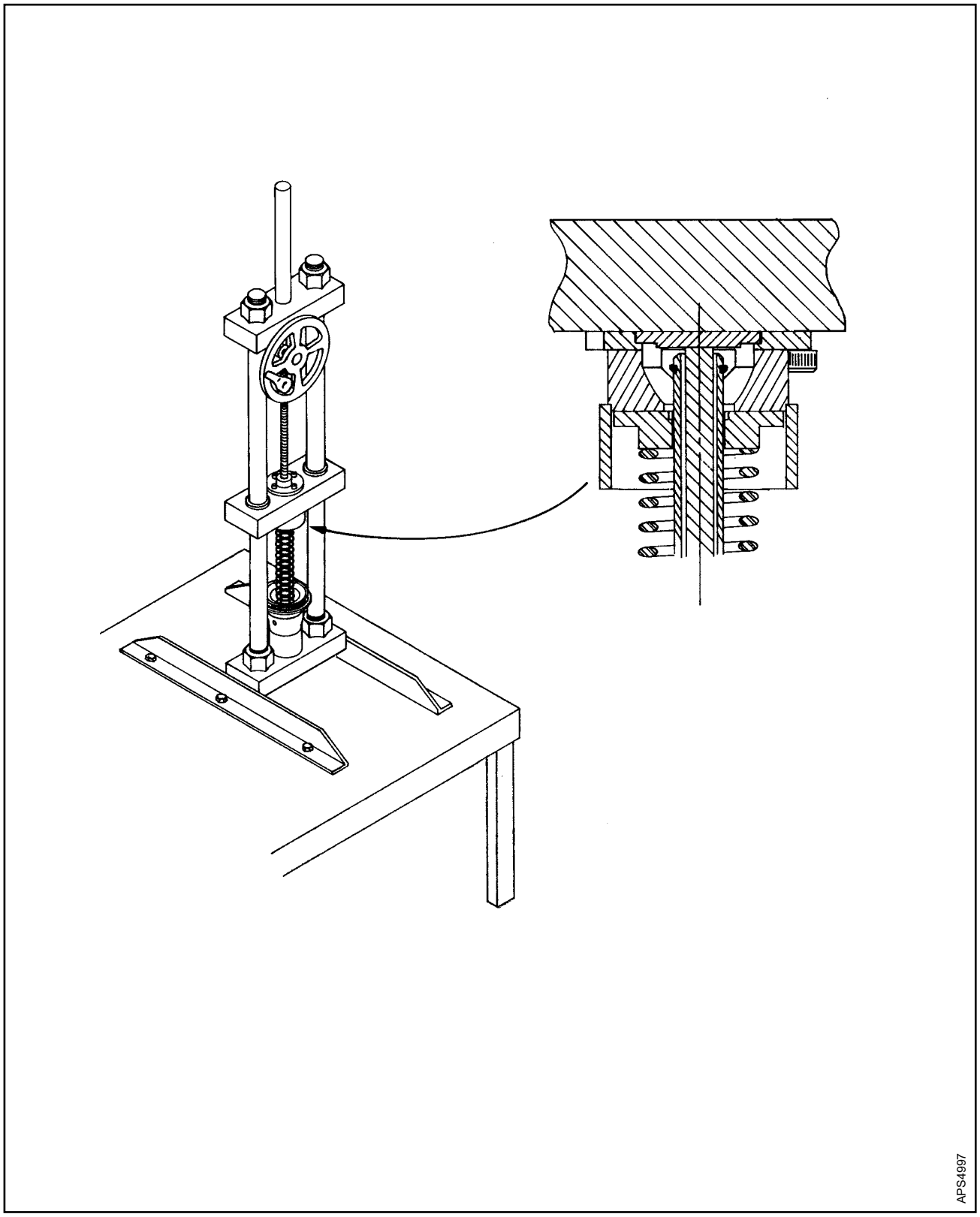
CAUTION: THE CHAMFERED SIDE OF THE GUIDE COLLAR UNIT (1060) MUST SEAT AGAINST THE CYLINDER SHOULDER. TO ALLOW PROPER HUB CLEARANCE, THE LARGER INSIDE DIAMETER OF THE GUIDE COLLAR MUST FACE THE HUB UNIT (700).

(2) Install the cap screw (1080) into the guide collar unit (1060).

(3) Install the guide collar unit (1060) onto the smaller diameter shoulder of the cylinder (540). Do not tighten the cap screw (1080). Allow the guide collar unit to rotate freely on the cylinder.

CAUTION: DO NOT APPLY HYDRAULIC SEALANT CM134 TO THE THREADS OF THE CYLINDER (540).

(4) Apply a bead of hydraulic sealant CM134 in the groove of the hub unit (700) for the cylinder O-ring (520).



Putting the Spring Assembly in the Spring Compressor Fixture
Figure 7-7

(5) Install the O-ring (520) into the cylinder (540) chamfer.

(6) Hand tighten the cylinder (540) and the guide collar unit (1060) if applicable, onto the hub unit (700).

(7) Using the applicable size square bar to fit the slot in the top of the cylinder (540), tighten the cylinder flush against the hub unit (700).

NOTE: Early drag and tightness is caused by the O-ring (520), that acts as a seal and safety.

(8) Torque the cylinder (540) against the shoulder of the hub unit (700). Refer to Table 8-1, "Torque Values", in the Fits and Clearances chapter of this manual.

(9) Visually examine the slot in the top of the cylinder (540) to make sure the square-bar wrench used for torquing did not raise any sharp edges or damage the threads.

(10) Remove any sharp edges in the wrench slot on top of the cylinder (540).

(11) Visually examine the inside of the cylinder (540). Make sure the O-ring (520) has not been forced out of position during the cylinder installation.

G. Spring Assembly

(1) Install the front spring retainer (650) onto the pitch change rod (670) with the flat plate facing the threaded end of the pitch change rod.

(2) Install the applicable spacer tube(s) onto the pitch change rod (670) against the front spring retainer (650).

(3) Install the spring (610) over the spacer tube(s) and against the front spring retainer (650).

(4) Put the rear spring retainer (630) on the spring (610).

(5) Put the threaded end of the pitch change rod (670) into the spring compressor fixture TE59 or equivalent. Refer to Figure 7-7.

(6) Compress the spring assembly (600) enough to install the split rear keeper (640) into the groove in the pitch change rod (670).

NOTE: Apply oil or grease to each half of the rear split keeper (640) to keep it in position until the spring (610) is decompressed.

WARNING: WHEN COMPRESSED, THE SPRING ASSEMBLY (600) IS LOADED TO APPROXIMATELY 1000 POUNDS (454 KG) FORCE. ENSURE THE SAFETY OF EVERYONE DURING THE ASSEMBLY PROCEDURES.

(7) Carefully unload pressure on the spring assembly (600).

(8) Before removing the spring assembly from the spring compressor fixture TE59 or equivalent, make sure that both rear split keeper halves (640) are in the groove in the pitch rod (670) and secured by the rear spring retainer (630).

H. Spring Assembly Installation

WARNING: DO NOT FORCE THE SPRING ASSEMBLY INTO THE CYLINDER. FORCING THE SPRING ASSEMBLY CAN CAUSE THE REAR SPRING RETAINER (630) TO RELEASE. IF THE FRONT SPLIT KEEPER (530) CAN NOT BE POSITIONED INTO THE CYLINDER GROOVES, LOOSEN THE MOUNTING BOLTS (1180) AND RAISE THE HUB (700) ENOUGH TO PERMIT THE FRONT SPLIT KEEPER TO SEAT IN THE CYLINDER GROOVE. AFTER THE FRONT SPLIT KEEPER IS IN POSITION, RETIGHTEN THE MOUNTING BOLTS.

(1) Install the spring assembly into the cylinder until the shoulder of the front spring retainer (650) is approximately 0.25 inch (6.35 mm) below the top of the cylinder (540), and install the front split keeper (530) into the groove in the cylinder.

(2) Pull the spring assembly (600) forward to permit contact with the front split keeper (530) and secure the spring assembly.

(3) Install each pitch stop spacer (550) with two fillister head screws (560).

NOTE 1: A longer pitch stop spacer will decrease feather blade angle by approximately 0.7 degrees.

NOTE 2: A shorter pitch stop spacer will increase feather blade angle by approximately 0.7 degrees.

(4) Safety the fillister head screws (560) with safety wire CM131.

I. Piston Assembly Installation

(1) Lubricate the O-ring (570) with grease CM12 or reciprocating engine oil.

(2) Install the O-ring (570) on the pitch change rod (670) in the groove below the threads.

(3) Lubricate the piston O-ring (60) with grease CM12 or reciprocating engine oil.

CAUTION: REFER TO THE APPLICABLE AIRCRAFT TYPE CERTIFICATE DATA SHEET AND/OR HARTZELL PROPELLER INC. APPLICATION GUIDE MANUAL 159 (61-02-59) FOR SPECIFIC BLADE ANGLES REQUIRED.

(4) Install the piston OD O-ring (60) in the groove closest to the hub (700). Refer to Figure 7-7.1.

(5) Cut the necessary length of piston dust seal material (50).

(a) Cut the piston dust seal material (50) 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 7-7.1, View A-A.

(6) Soak the piston dust seal (50) in aviation grade reciprocating engine oil until the seal is completely saturated.

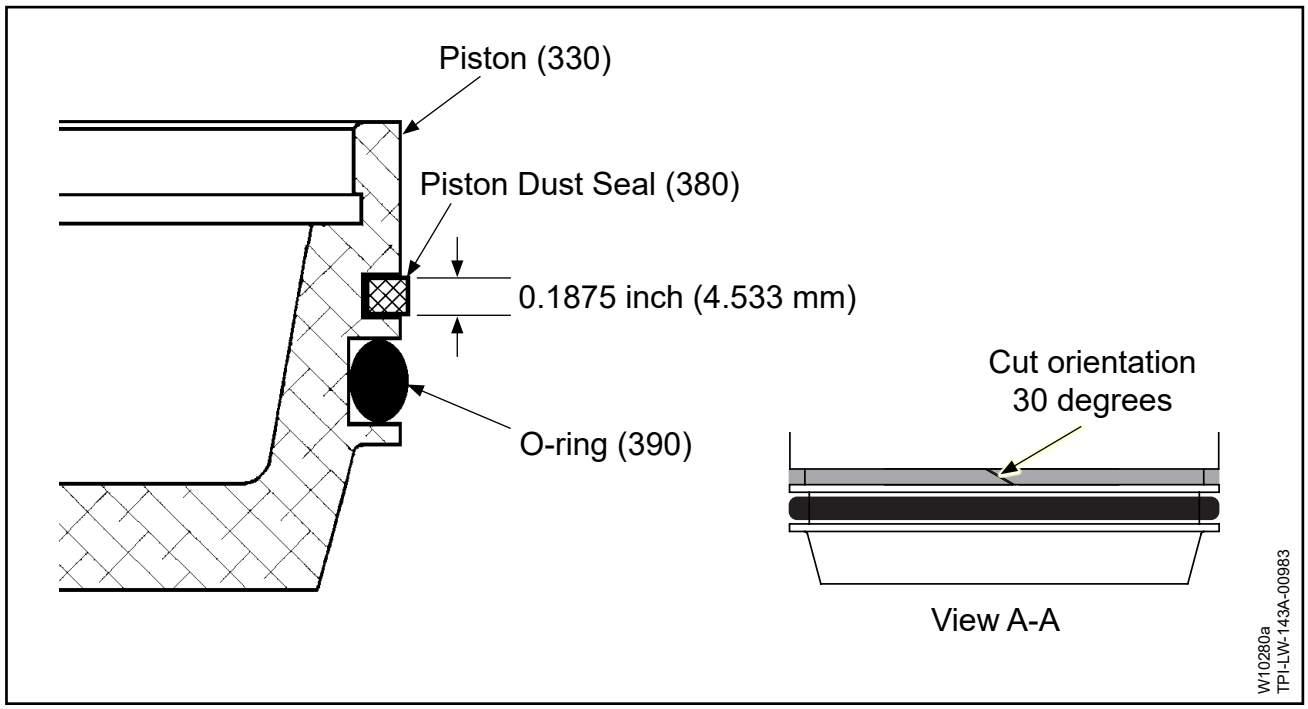
(7) Squeeze the excess oil from the piston dust seal (50).

CAUTION: MAKE SURE THAT THE PISTON DUST SEAL (50) IS FREE OF FUZZ.

(8) If the piston dust seal (50) has fuzz or long strands that could interfere with O-ring operation, replace the piston dust seal.

(9) Install the thinnest section of the piston dust seal (50) in the remaining piston OD groove. Refer to Figure 7-7.1.

(10) Move the piston assembly (20) into position over the cylinder (540).



Locations of the Piston O-ring and Piston Dust Seal
Figure 7-7.1

NOTE: Piston guide rods (120) are only installed on three-blade propellers in this model series and not on two-blade propellers. When assembling two blade propellers, ignore instructions concerning piston guide rods.

(11) Align the piston guide rods (120) with the holes in the guide collar unit (1060).

(12) Install the free end of each link arm (100) in the piston (30) link arm slot.

(13) Install all link pin units (80) and secure each link pin unit with a fillister head screw (90)

CAUTION: MAKE SURE THE PROPER FILLISTER HEAD SCREW (90) IS INSTALLED AND THAT ADEQUATE THREADS ARE AVAILABLE IN THE PISTON UNIT (30) TO HOLD THE SCREW IN POSITION. AT LEAST THREE THREAD LENGTHS ARE REQUIRED. DO NOT BIND THE LINK ARM (100).

(14) Operate the propeller assembly by hand to make sure that the piston assembly (20) moves freely.

(15) Seat the guide collar unit (1060) firmly against the cylinder (540), making sure the guide rods (120) move freely through the bushings (1090) in the guide collar unit.

(a) If the guide rods (120) do not move freely, rotate the guide collar unit (1060) to provide the correct alignment.

(16) Tighten the cap screw (1080) in the guide collar unit (1060).

(a) Torque the cap screw (1080) in accordance with Table 8-1, "Torque Values", in the Fits and Clearances chapter of this manual

(17) Push the piston assembly (20) down against the hub unit (700) to permit the threaded end of the pitch change rod (670) to protrude through the hole in the the piston assembly (20).

(18) Thread the self locking nut (10) onto the end of the pitch change rod (670).

(19) Using a wrench on the self locking nut (10) and a socket on the pitch change rod (670), tighten the self locking nut onto the end of the pitch change rod.

(a) Torque the self locking nut (10) in accordance with Table 8-1, "Torque Values", in the Fits and Clearances chapter of this manual.

(29) Where applicable, install the cap screw (150), washers (130), spacer (170), and thin hex nut (140) on the end of each piston guide rod (120).

J. Setting Blade Angle

(1) Refer to the section, "Finishing Procedures" in this chapter.

K. Blade Angle Reference Tape Application (Optional)

(1) Refer to the section, "Finishing Procedures" in this chapter.

L. Providing for Visual Detection of Blade Slippage in Clamp

(1) Refer to the section, "Finishing Procedures" in this chapter.

M. RTV CM93 Application

(1) Refer to the section, "Finishing Procedures" in this chapter.

N. Checking Blade Track

(1) Refer to the section, "Finishing Procedures" in this chapter.

O. Label Replacement

(1) Refer to the section, "Finishing Procedures" in this chapter.

P. Propeller Removal From Assembly Table

(1) Refer to the section, "Finishing Procedures" in this chapter.

Q. Propeller Balance

(1) Refer to the section, "Finishing Procedures" in this chapter.

R. Propeller Lubrication

(1) Refer to the section, "Finishing Procedures" in this chapter.

3. Assembly of Models in the HC-A(2, 3)(V, MV)20-2 Series

A. Hub Unit Assembly

(1) Follow the hub assembly procedure in the Steel Hub Overhaul chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).

B. Blade Mounting Parts Assembly

CAUTION: RACES (220, 290) MUST BE MATCHED SETS. RACE (220) IS THE INBOARD RACE AND RACE (290) IS THE OUTBOARD RACE.

(1) Put the rear mounting cone (1030) into the spline.

(2) Attach the hub unit (700) on the rotatable fixture of the assembly table, using the shaft nut (690) and hub puller ring (790) that will be used to mount the propeller on the engine.

CAUTION: MAKE SURE THE INTERNAL RECESS OF THE BEARING RETAINING RING (210) FACES OUTBOARD WHEN THE BEARING RETAINING RING IS SLIPPED OVER THE BLADE ARM FLANGE OF THE HUB UNIT (700).

(3) Using a light mallet and press tool TE309 or equivalent, move a bearing retaining ring (210) onto one blade arm flange of the hub unit (700). Refer to Figure 7-1.

NOTE: Move the bearing retaining ring (210) far enough onto the blade arm flange that the bearing retaining ring forms a narrow channel on the inboard surface of the flange.

(4) Using approved grease CM12, lightly grease the inboard face of each blade arm flange.

(5) Put a matched set of outboard races (290) in position over one hub arm.

NOTE: The break line for the outboard race (290) should be perpendicular to the table top.

(6) Using press tool TE309 and retention bearing puller TE108 or equivalents, push the bearing retaining ring (210) far enough onto the outboard race (290) to permit the insertion of the wire retention ring (200) into the groove in the blade arm flange. Refer to Figure 7-1.

(7) Install the wire retention ring (200) into the groove on the outer edge of the outboard race (290).

(8) Using press tool TE309 and retention bearing puller TE108 or equivalents, pull the bearing retaining ring (210) outboard far enough to permit the wire retention ring (200) and the bearing retaining ring to touch each other. The wire retention ring fits in the recess of the bearing retaining ring. Refer to Figure 7-1.

(a) Make sure the wire retention ring is fully enclosed and that it is not pinched.

(9) Lubricate the blade O-ring (260) with grease CM12 or aviation grade reciprocating engine oil.

(10) Move the O-ring over the blade arm flange of the hub unit (700) to a location inboard of the thrust bearing. Keep it there for use later in the reassembly.

(11) Repeat the assembly procedure for the remaining hub arms.

(12) Remove the hub unit (700) from the rotatable fixture on the assembly table.

(13) Using press tool TE309 or equivalent, hold the hub unit vertical as shown in Figure 7-2.

NOTE: The arm of the hub unit (700) being fitted with outboard races (290) must be face down so that the hub flange and bearing retaining ring (210) form a "cavity" that will hold the bearing balls (230).

CAUTION 1: THE BREAK LINE OF THE OUTBOARD RACE (290) MUST BE AT A RIGHT ANGLE TO THE BREAK LINE OF THE BLADE CLAMP HALVES (310).

CAUTION 2: ANY GAP BETWEEN THE HALVES OF THE RACES (220, 290) SHOULD BE NO GREATER THAN 0.001 INCH (0.0254 MM).

CAUTION 3: ALL BEARING BALLS (230) INSTALLED IN A SINGLE BEARING MUST BE OF THE SAME GAUGE. BEARING BALLS SUPPLIED BY HARTZELL PROPELLER INC. ARE OF THE SAME GAUGE.

(14) Install the ball spacer (240) and the necessary number of bearing balls (230) onto the outboard race (290).

(15) Apply a small amount of RTV CM93 to the chamfered edges (break point) of the matched set of inboard races (220).

(16) Remove unwanted sealant that could extrude into the bearing area when the race halves are joined.

CAUTION: THE OPENING OF THE WIRE BEARING RETAINER (250) MUST BE AT A RIGHT ANGLE TO THE PARTING LINE OF THE INBOARD RACE (220).

(17) Put the inboard race halves (220) around one blade arm of the hub unit (700) and install the wire bearing retainer (250) to hold the halves in position.

CAUTION: THE USE OF TOO MUCH RTV CM93 COULD CAUSE UNEVEN SEATING BETWEEN THE CLAMP ASSEMBLY (300) AND RACE (220).

(18) Apply a small bead of RTV CM93 to the inboard race (220) at the break point in order to evenly fill the void in the chamfered area of the race.

(19) Move the O-ring (260) outboard against the inboard race (220).

(20) Wrap wide masking tape around the outside diameter of the bearing assembly to hold the parts in position.

(21) Repeat this procedure for the remaining blade arms.

C. Spinner Bulkhead and Start Lock Assembly

(1) Put the start lock pin (950) into the start lock bracket (910).

(2) Put the compression spring (940) into the start lock bracket (910) against the start lock pin (950).

(3) Compress the compression spring (940) with the washer (930).

(4) Put the cotter pin (920) into the start lock bracket (910) to keep the washer (930), compression spring (940), and start lock pin (950) in the start lock bracket.

(5) Open the cotter pin (920) to keep the assembly in position.

(6) Install the rear mounting cone (1030) onto the bulkhead.

(7) Install the spinner bulkhead and rear mounting cone (1030) onto the rotatable fixture of a propeller assembly table.

(8) Attach the start lock assemblies (900) to the spinner bulkhead.

(9) Examine the clearance between each clamp assembly (300) and start lock assembly (900).

(a) To relieve interference, local polishing on the start lock bracket (910) to a maximum of 0.020 inch (0.51 mm) is permitted. Refer to Figure 7-3.

(b) Remove all polish marks from the repaired surface and apply chemical conversion coating as specified in the Chromic Acid Anodizing chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).

(10) Retract the start lock pins (950) for assembly, and hold them in position with a wire inserted in the hole in the start lock bracket (910).

CAUTION 1: THE PROPELLER MUST ACTUATE WITHOUT INTERFERENCE FROM THE START LOCK PLATE (1400).

CAUTION 2: THE START LOCK PLATE (1400) MUST TOUCH AT LEAST ONE HALF OF THE DIAMETER OF THE START LOCK PIN (950) WHEN THE START LOCK ASSEMBLY (900) IS ENGAGED.

(11) Install the hub unit (700) on the rotatable fixture of a propeller assembly table using a shaft nut wrench TE146 or equivalent, to tighten the shaft nut.

NOTE: Use the shaft nut (690) and hub puller ring (790) that will be used to mount the propeller on the engine.

D. Installing Blades and Clamps

(1) For clamp assembly procedures, refer to the Blade Clamp Overhaul chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).

(2) For all models, refer to the Hartzell Propeller Inc. Application Guide Manual 159 (61-02-59) for information on the correct counterweight slugs and mounting hardware.

CAUTION: A LINK ARM (100) CANNOT BE INSTALLED AFTER THE CLAMP (300) HAS BEEN INSTALLED ON THE HUB UNIT.

(3) After each clamp (300) is assembled:

(a) Install the linkscrew sleeve (110) onto the linkscrew (390).

(b) Install the link arm bushing (385) onto the linkscrew (390), if applicable.

(c) Install the link arm (100) onto the linkscrew (390).

NOTE: The raised shoulder on the link arm (100) must face the clamp.

(d) Push the cotter pin (280) through the hole in the end of the linkscrew (390) and open the cotter pin to secure the link arm (100) to the clamp assembly (700).

NOTE: The link arm (100) should move freely on the linkscrew (390).

(e) Attach a start lock plate (1400) on the inboard side of each lower clamp half (310) with fasteners (1410), as applicable.

(f) Repeat this procedure for the remaining clamp assemblies (300).

(4) With the hub assembly (700) mounted on the rotatable fixture of the assembly table, follow the procedure for checking blade track found in this chapter.

(5) Check blade track

CAUTION: BLADE HEIGHTS AT THE TIP SHOULD NOT VARY MORE THAN 0.125 INCH (3.18 MM).

(a) Turn the propeller on the rotatable fixture, and check the height at the tip of each blade using a gauge and adjustable pointer.

(b) If all blades do not track:

1 Make sure there is no debris between the rotatable fixture flange and the propeller hub flange.

2 A blade or blades not in tolerance with the majority must be removed and reinspected for blade face alignment in accordance with Hartzell Propeller Inc. Aluminum Blade Overhaul Manual 133C (61-13-33).

WARNING: AIR TRAPPED IN THE LUBRICANT CAN AFFECT PROPELLER BALANCE AFTER RUN-UP.

(6) Stand blade number one in vertical position (base up, tip down) and fill the pilot tube cavity with grease CM12 to the top level of the bottom inboard bearing.

(7) Move the blade onto the pilot tube (720). Push the blade toward the center of the hub until the butt of the blade shank touches with the face of the blade arm.

NOTE: A small amount of grease will escape out around the pilot tube if the blade has been lubricated correctly.

(8) Repeat this procedure for the remaining blades.

(9) Apply a bead of RTV CM93 approximately 0.125 inch (3.175 mm) wide and 0.06 inch (1.524 mm) thick to both clamp halves (310) on the mating surfaces and in the inboard bearing radius as shown in Figure 7-4.

(10) Remove the masking tape used to temporarily hold the bearing assembly together.

CAUTION: THE PARTING LINE OF THE CLAMP-HALVES (310) MUST BE AT A RIGHT ANGLE TO THE PARTING LINE OF THE INBOARD RACE (220).

(11) Put the counterweighted clamp half (310) on the blade and bearing assembly. Join the corresponding lower clamp body, enclosing the bearing.

(12) Put a clamp gasket (430) between each of the clamp-half (310) parting surfaces.

CAUTION 1: A 0.06 INCH (1.59 mm) MAXIMUM OF GASKET MATERIAL SHOULD BE EVENLY EXPOSED THROUGH THE PARTING LINE ON EACH SIDE OF THE CLAMP ASSEMBLY (300). THE CLAMP GASKET (430) MUST BE TRIMMED AS NECESSARY TO PROVIDE METAL-TO-METAL CONTACT WHERE THE CLAMP LUGS MEET.

CAUTION 2: DO NOT TORQUE THE OUTBOARD CLAMP BOLTS AT THIS STEP OF ASSEMBLY.

(13) Install the outboard clamp bolts (460).

(14) Install the washers (410) and self locking nuts (420). Hand-tighten the self locking nuts.

NOTE: This step helps align the clamp gasket.

(15) Install the inboard clamp screws (440).

CAUTION 1: DO NOT EXCEED THE RECOMMENDED TORQUE FOR THE CLAMP SOCKET SCREWS. REFER TO TABLE 8-1, "TORQUE VALUES", IN THE FITS AND CLEARANCES CHAPTER OF THIS MANUAL.

CAUTION 2: CLAMP SOCKET SCREWS MUST BE TORQUED IN THE SEQUENCE SPECIFIED.

(16) Torque the inboard clamp screws (440) in 10 In-Lb increments (20, 30, etc.) alternating between inboard clamp screws at each increment.

(a) Torque the inboard clamp screws in accordance with Table 8-1, "Torque Values", in the Fits and Clearances chapter of this manual

CAUTION: DO NOT CONTACT THE CLAMP WHILE DRILLING THE INBOARD CLAMP SCREWS.

(17) With a #42 size bit, drill the head of each inboard clamp screw (440).

(18) Safety each inboard clamp screw (440) with a cotter pin (450) so that the cotter pin touches the clamp half (310) and prevents the inboard clamp screw from backing out of the clamp assembly (300).

(a) If an installed cotter pin (450) causes interference, three loops of safety wire CM131 can be used to safety the inboard clamp screws (440).

(19) Attach a start lock plate (1400) on the inboard side of each lower clamp half (310) with fasteners (1410), as applicable.

(a) There must be clearance between the OD of the start lock plate (1400) and the spinner mounting plate or bulkhead.

(b) There must be clearance between the start lock bracket (910) and the head of the inboard clamp screw (440).

(c) Washers can be installed between the start lock plate (1400) and clamp assembly (300) to move the start lock plate and make the interface with the start lock pin (950) better.

(20) Safety the start lock plate fasteners (1410) with safety wire CM131.

(21) Repeat this procedure for the remaining blades and clamps.

E. Installing the Cylinder and Guide Collar

(1) Clean the threads on the hub unit (700) and cylinder (540).

(2) Install the cap screw (1080) into the guide collar unit (1060).

CAUTION: MAKE SURE THE CHAMFER OF THE GUIDE COLLAR (1060) IS FACING THE CYLINDER SHOULDER FOR HUB CLEARANCE.

(3) Install the guide collar unit (1060) onto the smaller diameter shoulder of the cylinder (540). Do not tighten the cap screw (1080). Allow the guide collar unit to rotate freely on the cylinder (540).

NOTE: Splined hub models require the shaft nut (690) and puller ring (740) be installed in the hub before the cylinder (540) is installed.

CAUTION: DO NOT APPLY HYDRAULIC SEALANT CM134 TO THE THREADS OF THE CYLINDER (540). HYDRAULIC SEALANT IN THE CYLINDER MAY CONTAMINATE THE AIRCRAFT ENGINE OIL.

(4) Apply a bead of hydraulic sealant CM134 in the groove of the hub unit (700) for the cylinder O-ring (520).

(5) Install the O-ring (520) into the cylinder (540) chamfer.

(6) Using the applicable size square bar to fit the slot in the top of the cylinder (540), tighten the cylinder flush against the hub unit (700).

NOTE: Early drag and tightness is caused by the O-ring (520), that acts as a seal and safety.

(7) Torque the cylinder (540) against the shoulder of the hub unit (700). Refer to Table 8-1, "Torque Values", in the Fits and Clearances chapter of this manual.

(8) Visually examine the slot in the top of the cylinder (540) to make sure the square-bar wrench used for torquing did not raise any sharp edges or damage the threads.

(9) Remove any sharp edges in the wrench slot on the top of the cylinder (540).

(10) Visually examine the inside of the cylinder (540) to make sure the O-ring (520) has not been forced out of position during the cylinder installation procedure.

F. Spring Assembly

(1) Install the front spring retainer (650) onto the pitch change rod (670) with the flat plate facing the threaded end of the pitch change rod.

(2) Install the applicable spacer tube(s) onto the pitch change rod (670) against the front spring retainer (650).

(3) Install the spring (610) over the spacer tube(s) and against the front spring retainer (650).

(4) Put the rear spring retainer (630) on the spring (610).

(5) Put the threaded end of the pitch change rod (670) into the spring compressor fixture TE59 or equivalent.

(6) Compress the spring assembly (600) enough to install the split rear keeper (640) into the groove in the pitch change rod (670).

NOTE: Apply grease or oil to each half of the rear split keeper (640) to keep it in position until the spring is decompressed.

WARNING: WHEN COMPRESSED, THE SPRING ASSEMBLY (600) IS LOADED TO APPROXIMATELY 1000 POUNDS (454 KG) FORCE. ENSURE THE SAFETY OF EVERYONE DURING THE ASSEMBLY PROCEDURES.

(7) Carefully unload pressure on the spring assembly (600).

(8) Before removing the spring assembly from the spring compressor fixture TE59 or equivalent, make sure that both rear split keeper halves (640) are in the groove in the pitch rod (670) and secured by the rear spring retainer (630).

G. Spring Assembly Installation

(1) Install the shoulder of the front spring retainer (650) approximately 0.25 inch (6.35 mm) into the cylinder (540), and install the front split keeper (530) into the groove in the cylinder.

(2) Pull the spring assembly (600) forward to permit contact with the front split keeper (530) and secure the spring assembly.

(3) Install each pitch stop spacer (550) with two fillister head screws (560).

NOTE 1: The height of the pitch stop spacers (550) will determine the feathering blade angle. A longer pitch stop spacer will decrease feather blade angle by approximately 0.7, and a shorter pitch stop spacer will increase feather blade angle by approximately 0.7.

NOTE 2: It is not necessary to safety wire the filister head screws (560) at this time. The screws must be safetied when the propeller is installed.

H. Piston Assembly Installation

(1) Lubricate the pitch change rod O-ring (570) with approved grease CM12 or aviation grade reciprocating engine oil.

(2) Install the O-ring (570) on the pitch change rod (670) in the groove below the threads.

(3) Lubricate the piston O-ring (60) with grease CM12 or reciprocating engine oil.

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

(4) Install the piston OD O-ring (60) in the groove closest to the hub. Refer to Figure 7-7.1.

(5) Cut the necessary length of piston dust seal material (50).

(a) Cut the piston dust seal material (50) 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 7-7.1, A-A.

(6) Soak the piston dust seal (50) in aviation grade reciprocating engine oil until the seal is completely saturated.

(7) Squeeze the excess oil from the piston dust seal (50).

CAUTION: MAKE SURE THAT THE PISTON DUST SEAL (50) IS FREE OF FUZZ.

(8) If the piston dust seal (50) has fuzz or long strands that could interfere with O-ring operation, replace the piston dust seal.

(9) Install the thinnest section of the piston dust seal (50) in the remaining piston OD groove. Refer to Figure 7-7.1.

(10) Move the piston assembly (20) into position over the cylinder (540).

(11) Align the piston guide rods (120) with the holes in the guide collar unit (1060).

(12) Install the free end of each link arm (100) in the piston (30) link arm slot.

(13) Install all link pin units (80) and secure each link pin unit with a fillister head screw (90).

CAUTION: MAKE SURE THE PROPER FILLISTER HEAD SCREW (90) IS INSTALLED AND THAT ADEQUATE THREADS ARE AVAILABLE IN THE PISTON UNIT (30) TO HOLD THE SCREW IN POSITION. AT LEAST THREE THREAD LENGTHS ARE REQUIRED. DO NOT BIND THE LINK ARM (100).

(14) Operate the propeller assembly by hand to make sure the piston assembly (20) moves freely.

(15) Seat the guide collar unit (1060) firmly against the cylinder, making sure the guide rods (120) move freely through the bushings (1090) in the guide collar unit.

(a) If the guide rods (120) do not move freely, rotate the guide collar unit (1060) to provide the correct alignment.

(16) Tighten the cap screw (1080) in the guide collar unit (1060).

(17) Torque the cap screw (1080) in accordance to Table 8-1, "Torque Values", in the Fits and Clearances chapter of this manual.

(18) Push the piston assembly (20) down against the hub unit (700) to permit the threaded end of the pitch change rod to protrude through the end of the piston.

(19) Thread the self locking nut (10) onto the end of the pitch change rod (670).

(20) Using a wrench on the self locking nut (10) and a socket on the pitch change rod (670), tighten the flexlock nut onto the end of the pilot tube.

(a) Torque the self locking nut (10) in accordance with Table 8-1, "Torque Values", in the Fits and Clearances chapter of this manual

(21) Where applicable install the cap screw (150), washers (140), and nut (130) on the end of each piston guide rod (120).

I. Setting Blade Angle

(1) Refer to the section, "Finishing Procedures" in this chapter.

J. Blade Angle Reference Tape Application (Optional)

(1) Refer to the section, "Finishing Procedures" in this chapter.

K. Providing for Visual Detection of Blade Slippage in Clamp

(1) Refer to the section, "Finishing Procedures" in this chapter.

L. RTV CM93 Application

(1) Refer to the section, "Finishing Procedures" in this chapter.

M. Checking Blade Track

(1) Refer to the section, "Finishing Procedures" in this chapter.

N. Label Replacement

(1) Refer to the section, "Finishing Procedures" in this chapter.

O. Propeller Removal From Assembly Table

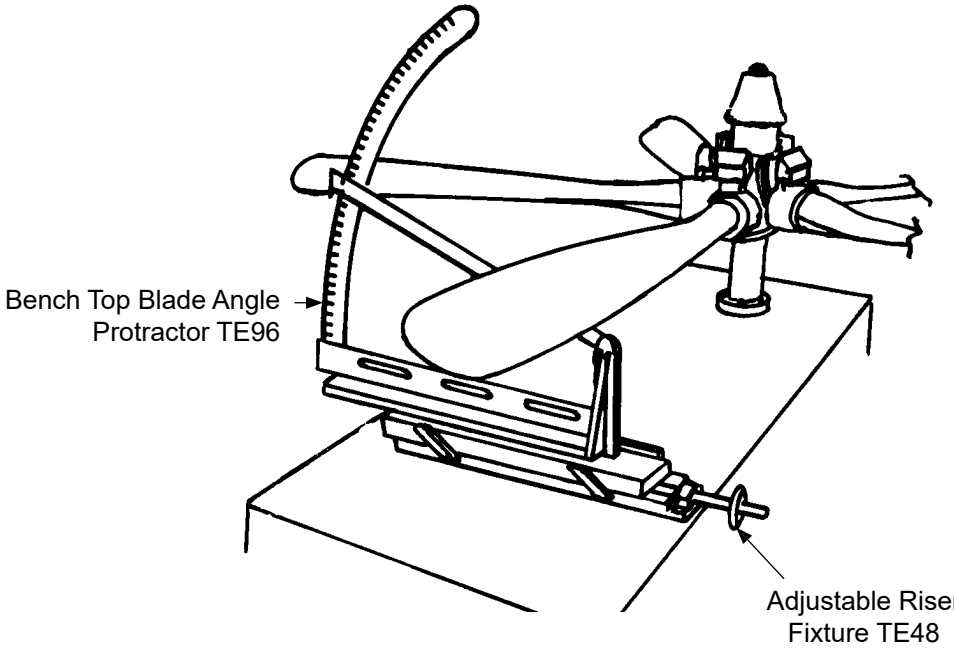
(1) Refer to the section, "Finishing Procedures" in this chapter.

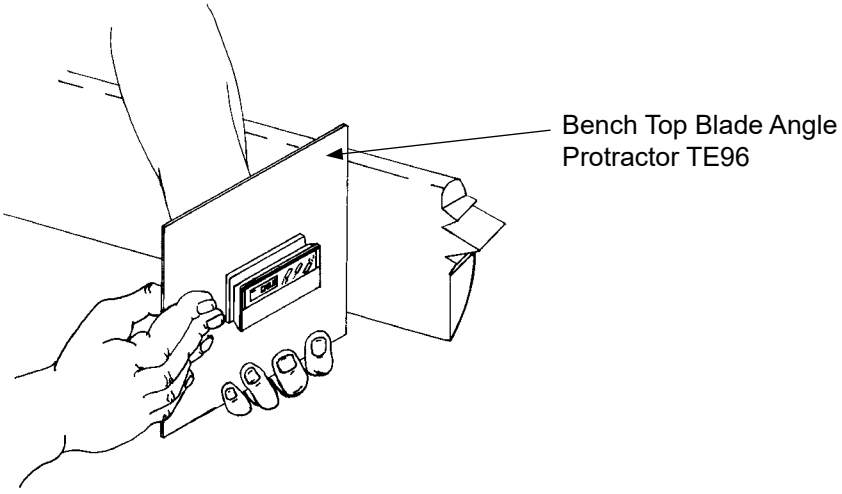
P. Propeller Balance

(1) Refer to the section, "Finishing Procedures" in this chapter.

Q. Propeller Lubrication

(1) Refer to the section, "Finishing Procedures" in this chapter.





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Setting Blade Angle
Figure 7-8

4. Finishing Procedures

A. Setting Blade Angle

NOTE: The outboard mounting hardware has not been tightened. It will be secured when adjustments to the blade angles are completed.

(1) Apply pressure through the rotatable fixture on the propeller assembly table. This will actuate the propeller to the low pitch position.

(2) Use a hand held protracter, such as TE97 or equivalent, or a bench-top protractor, such as or equivalent, at the reference blade radius specified in the Hartzell Propeller Inc. Application Guide Manual 159 (61-02-59), to adjust the angle of the blades. Refer to Figure 7-8.

NOTE: Refer to the applicable Type Certificate Data sheet, Supplemental Type Certificate Data sheet, or Hartzell Propeller Inc. Application Guide Manual 159 (61-02-59), for the required blade angles.

(3) Rotate the blades to low pitch position within the clamp assemblies (300) and check blade angles.

NOTE: Blade angles must be within 0.2 degree of each other at low pitch.

(4) Tighten the self locking nuts (420) onto the outer clamp bolts (460).

(a) Torque the self locking nuts (420) in accordance with Table 8-1, "Torque Values", in the Fits and Clearances chapter of this manual.

(5) Check the angle of each blade and confirm that the maximum blade angle variance between blades is 0.2 degree. If it is not, then reset the blades.

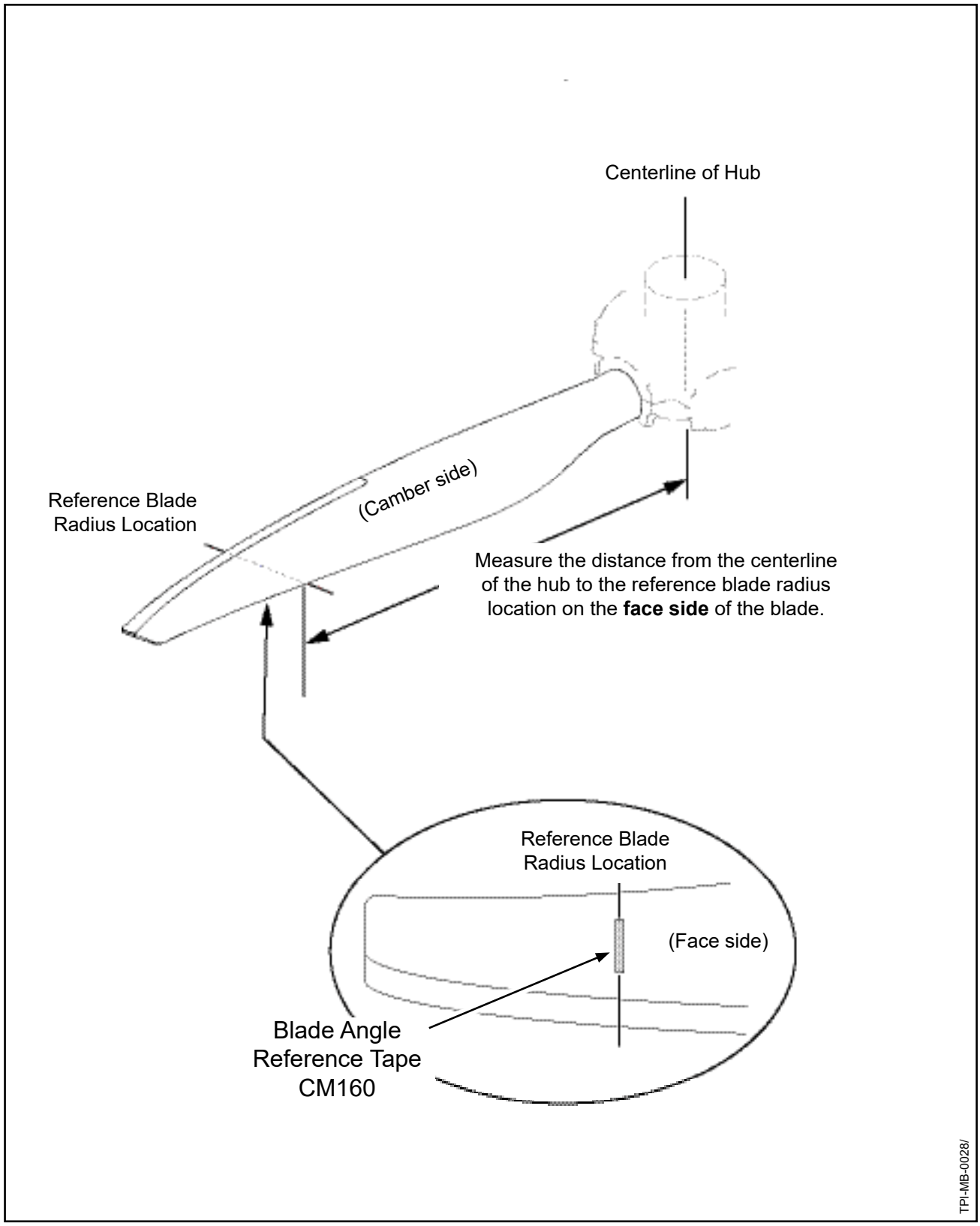
(6) Remove pressure from the propeller piston and allow the pitch change mechanism to actuate to feather position.

(7) Use a hand held protracter, such as TE97 or equivalent, or a bench-top protractor, such as bench top blade angle protractor TE96 or equivalent, at the reference blade radius to check the feather blade angle. Refer to Figure 7-8. If the feather angle is incorrect, remove the piston assembly (20) and install different pitch stop spacers (550). After reinstalling the piston, cycle the propeller, and recheck the feather angle.

NOTE 1: Refer to the applicable Type Certificate Data sheet, Supplemental Type Certificate Data sheet, or Hartzell Propeller Inc. Application Guide Manual 159 (61-02-59), for the required blade angles.

NOTE 2: A longer pitch stop spacer will decrease feather blade angle by approximately 0.7 degree, and a shorter pitch stop spacer will increase feather blade angle by approximately 0.7 degree.

(8) Remove the link pin units (80), disengage the link arms (100) and rotate the clamp assemblies (300) by hand.



Blade Angle Reference Tape
Figure 7-9

(9) Release the start lock pins (950) in the start lock assemblies (900) to permit them to engage the start lock plates (1400) on the inboard side of clamp assemblies (300).

(10) Use a bench top protractor, such as bench top blade angle protractor TE96 or equivalent, at the reference blade radius to check the start lock blade angle. Refer to Figure 7-8.

(a) Refer to the Aircraft Type Certificate Data sheet, Supplemental Type Certificate Data sheet, or the Hartzell Propeller Inc. Application Guide Manual 159 (61-02-59), for all blade angles required for the applicable aircraft installation.

(11) To adjust the start lock angle, filing the start lock plate (1400) is permitted.

(a) After filing, remove all marks from the repaired surface with emery cloth.

(b) Recheck the blade angles.

(12) Apply a thin layer of anti-seize compound CM118 in the hole of the free end of each link arm.

(13) Install the link pin units (80) and secure them with fillister head screws (90).

NOTE: It is not necessary to safety wire the fillister head screws during assembly. The screws must be safetied when the propeller is installed.

B. Blade Angle Reference Tape Application (Optional) (Rev. 2)

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.

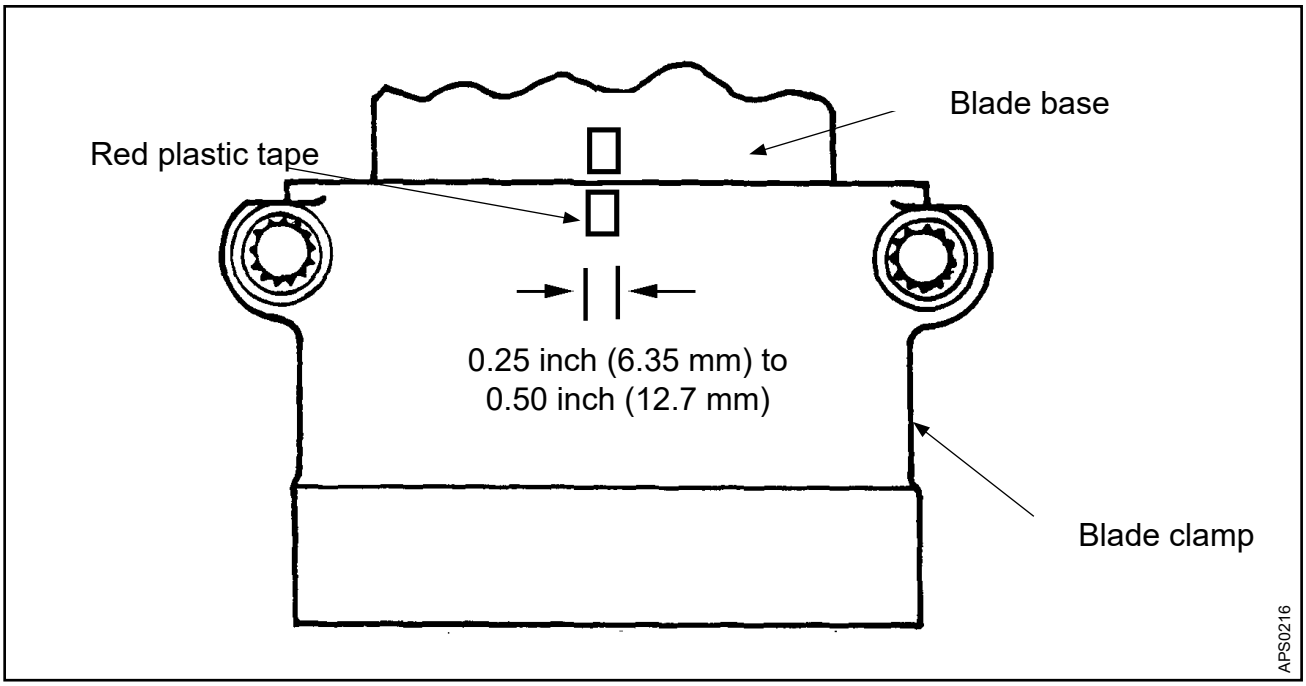
(2) Blade stations are used during the repair or overhaul process of a blade to define a blade span location for dimensional measurement.

(3) Establish a reference blade radius location

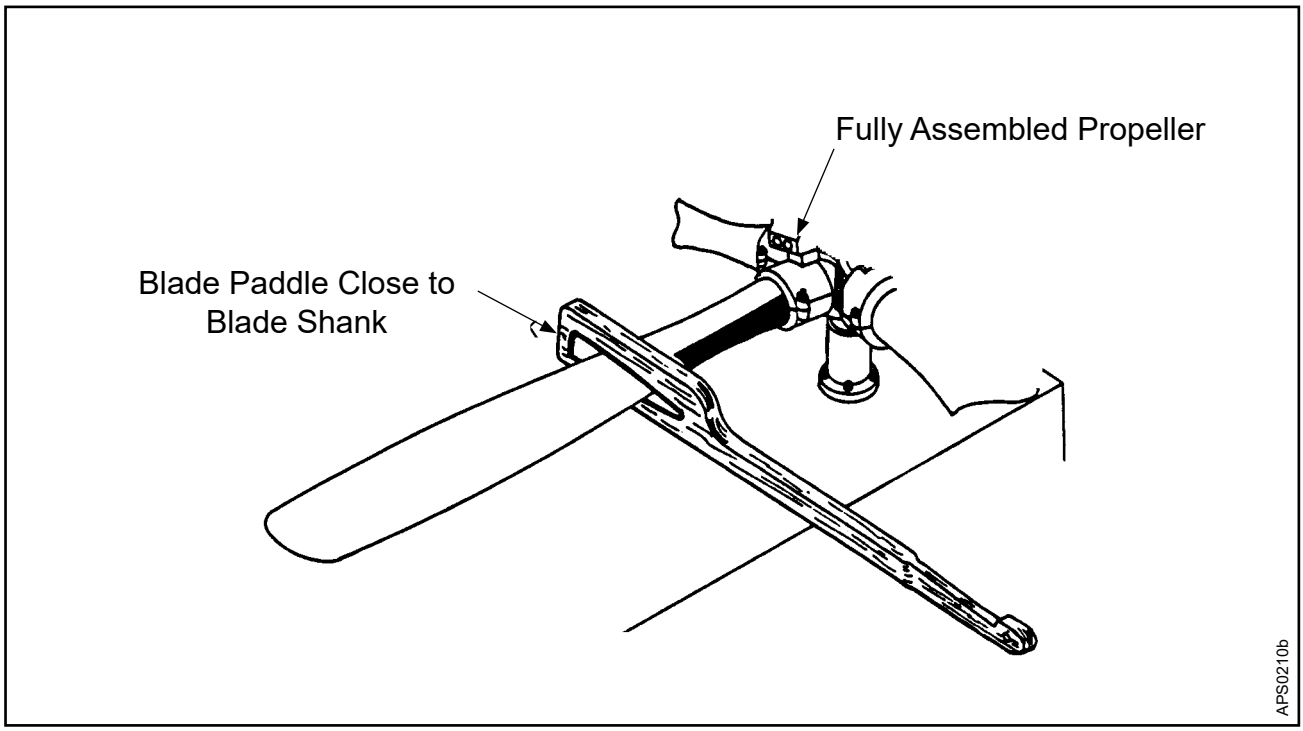
(a) Refer to the Aircraft Type Certificate Data Sheet or the Hartzell Propeller Inc. Application Guide, Manual 159 (61-02-59), for the reference blade radius location specified for the applicable aircraft installation.

(b) Beginning with blade one, measure from the center of the propeller hub to the reference blade radius location specified. Refer to Figure 7-9.

(c) Apply a piece of reference tape CM160 to the face side of the blade at the reference blade radius location, perpendicular to the blade centerline as shown in Figure 7-9.



Providing for Visual Detection of Blade Slippage in Blade Clamp
Figure 7-10



Using Blade Paddle to Examine for Blade Slippage in Blade Clamp
Figure 7-11

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 protective spray CM129 to prevent peeling.

C. Providing for Visual Detection of Blade Slippage in Clamp

(1) With the propeller still mounted on the rotatable fixture of the assembly table, use the following procedure to detect slippage between the blade base and the clamp assembly.

CAUTION: DO NOT USE A PUNCH OR SCRIBE A LINE ON THE BLADE BASE. THIS COULD START A CRACK IN THE BLADE.

(a) Place a strip of red plastic tape down the base and across the clamp of blade number one as shown in Figure 7-10.

(b) Carefully slit the tape along the line where the blade and clamp assembly meet.

(c) Repeat this procedure on the remaining blade assemblies.

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

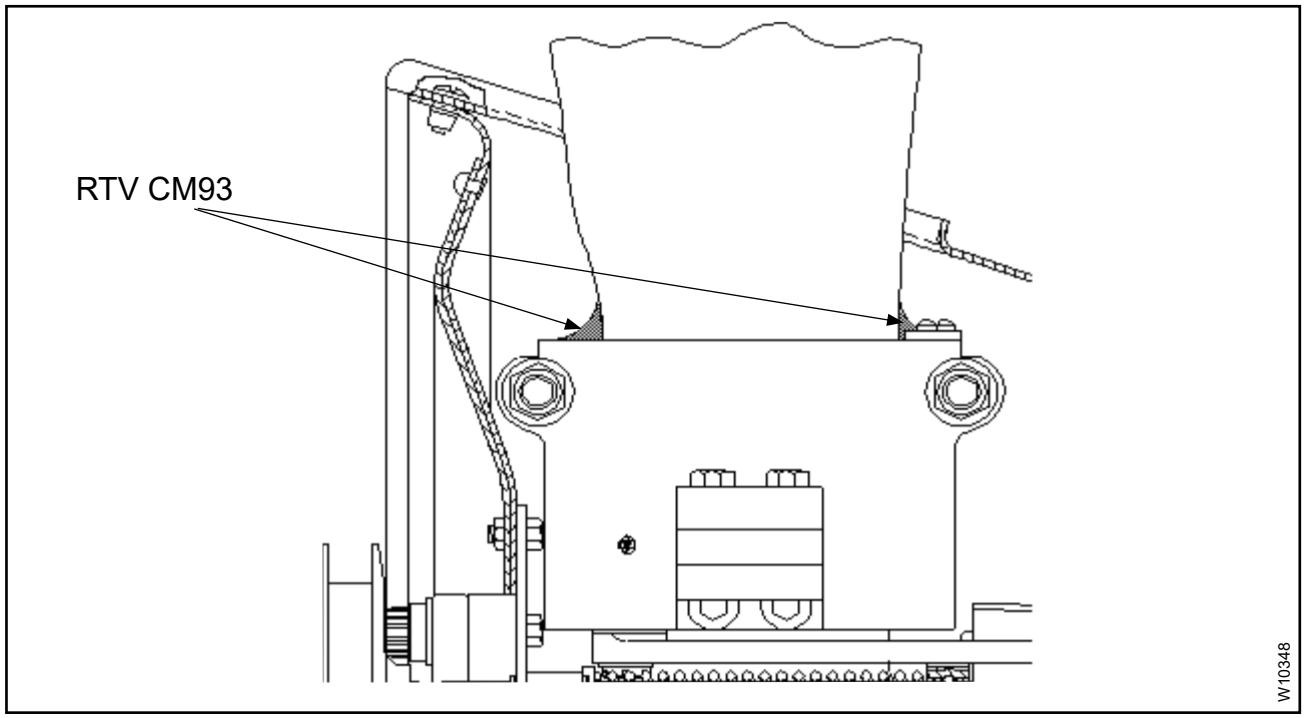
(d) Using a padded blade paddle, as shown in Figure 7-11, apply torque to each blade assembly in accordance with Table 8-1, "Torque Values", in the Fits and Clearances chapter of this manual.

1 Torque the blade toward low pitch.

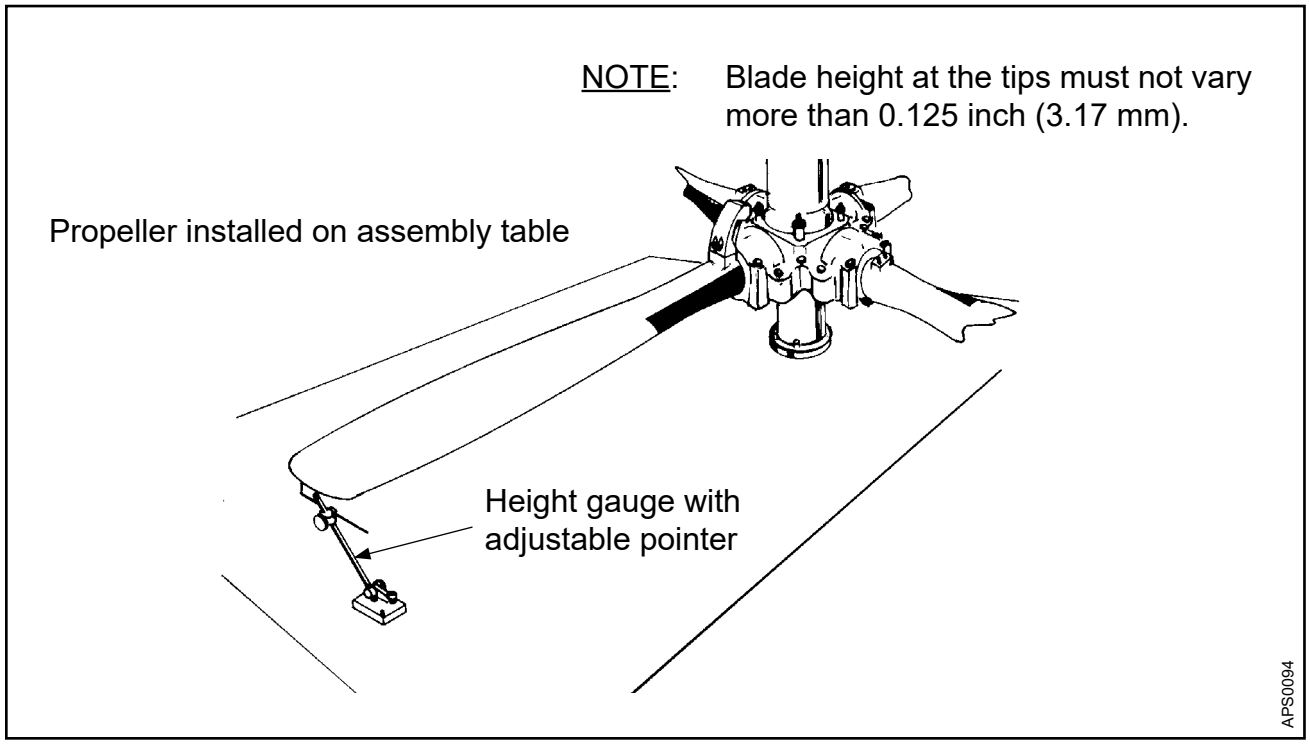
(e) Recheck blade angles in accordance with the instructions in this chapter.

(f) If blade slippage occurs, refer to the Blade Clamp Overhaul chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).

(g) After confirming there is no slippage, spray all pieces of tape with clear protective spray CM129 to provide a clear protective coating.



RTV CM93 Application
Figure 7-12



Checking Blade Track
Figure 7-13

D. RTV CM93 Application

(1) The application of RTV CM93 to the blade/blade clamp interface is an optional procedure that may provide additional protection against corrosion of the blade retention components.

CAUTION 1: THIS PROCEDURE MUST ONLY BE PRFORMED ON PROPELLERS THAT HAVE EXPERIENCED DISASSEMBLY AND CLEANING OF BLADE RETENTION COMPONENTS.

CAUTION 2: FOR CORRECT ADHESION OF RTV CM93, BLADE AND BLADE CLAMP (300) SURFACES MUST BE FREE OF GREASE AND DIRT.

(2) After performing the check for blade slippage in the clamp (300), fill the external void at the blade/blade clamp interface with a 0.25 inch (6.35 mm) maximum bead of RTV CM93, around the entire circumference of the blade, as shown in Figure 7-12.

(3) Permit the sealant to cure for a minimum of two hours before returning the propeller to service.

E. Checking Blade Track

(1) Attach the propeller on a rotatable fixture.

(2) Check the height at the tip centerpoint of the highest blade, using a scale with at least 1/32 inch (0.79 mm) divisions and adjustable pointer, as shown in Figure 7-13.

(3) Rotate the propeller and measure the variation of each blade.

NOTE: Blade height at the tips should not vary more than 0.125 inch (3.18 mm).

F. Label Replacement

(1) Refer to the Parts Identification and Marking chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02) for information on label usage.

G. Propeller Removal From Assembly Table

(1) For the HC-A(2, 3)(V, MV)(F,K,L) -2 Series Propeller:

(a) Unfasten the bolts that hold the propeller hub to the rotatable fixture of the propeller assembly table.

(b) Remove the propeller assembly and place it on a propeller cart for transportation.

(c) Attach the spinner bulkhead to the start lock assemblies (900), as applicable.

NOTE 1: On "F" flange propellers of this model series, the spinner bulkhead attaches to the start lock assemblies (900).

NOTE 2: On "L" and "K" flange propellers of this model series, the bulkhead is a ring that attaches to the engine starter ring gear.

(2) For the HC-A(2, 3)(V, MV)20-2 Series Propeller:

NOTE: The propeller must be in feather position when removed from the assembly table.

(a) Remove the piston assembly (20).

(b) Loosen the shaft nut with special tool TE146 or equivalent.

(c) Remove the spring assembly (600).

(d) Remove the propeller and position it on a propeller cart for transportation.

(e) Remove the spinner bulkhead with the start lock assemblies attached, and position it on a propeller cart for transportation. The rear cone must stay with the propeller.

H. Propeller Balance

(1) Balance the propeller in accordance with the Static and Dynamic Balance chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).

I. Propeller Lubrication

(1) Lubricate the propeller in accordance with the Propeller Lubrication chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).

FITS AND CLEARANCES - CONTENTS

LIST OF FIGURES

LIST OF TABLES

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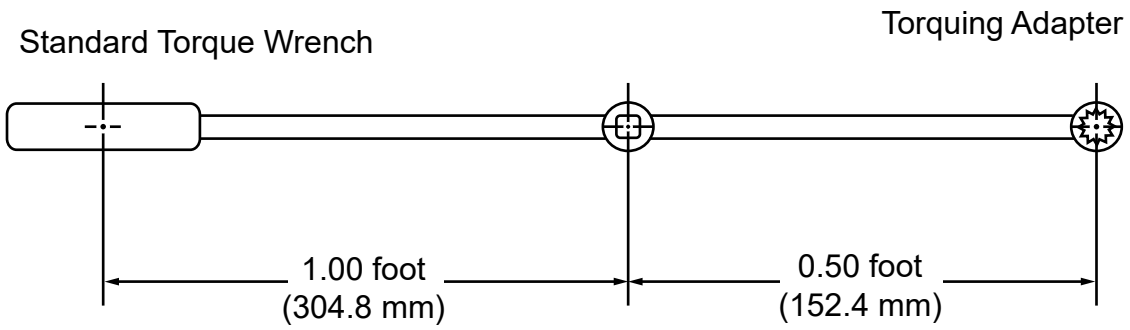


$$\frac{\text{(actual torque required) x (torque wrench length)}}{\text{(torque wrench length) + (length of adapter)}} = \text{torque wrench reading to achieve required actual torque}$$

EXAMPLE:

$$\frac{\text{100 Ft-Lb (136 N•m) x 1 ft (304.8 mm)}}{\text{1 ft (304.8 mm) + 0.50 ft (152.4 mm)}} = \text{66.7 Ft-Lb (9.1 N•m)}$$

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.

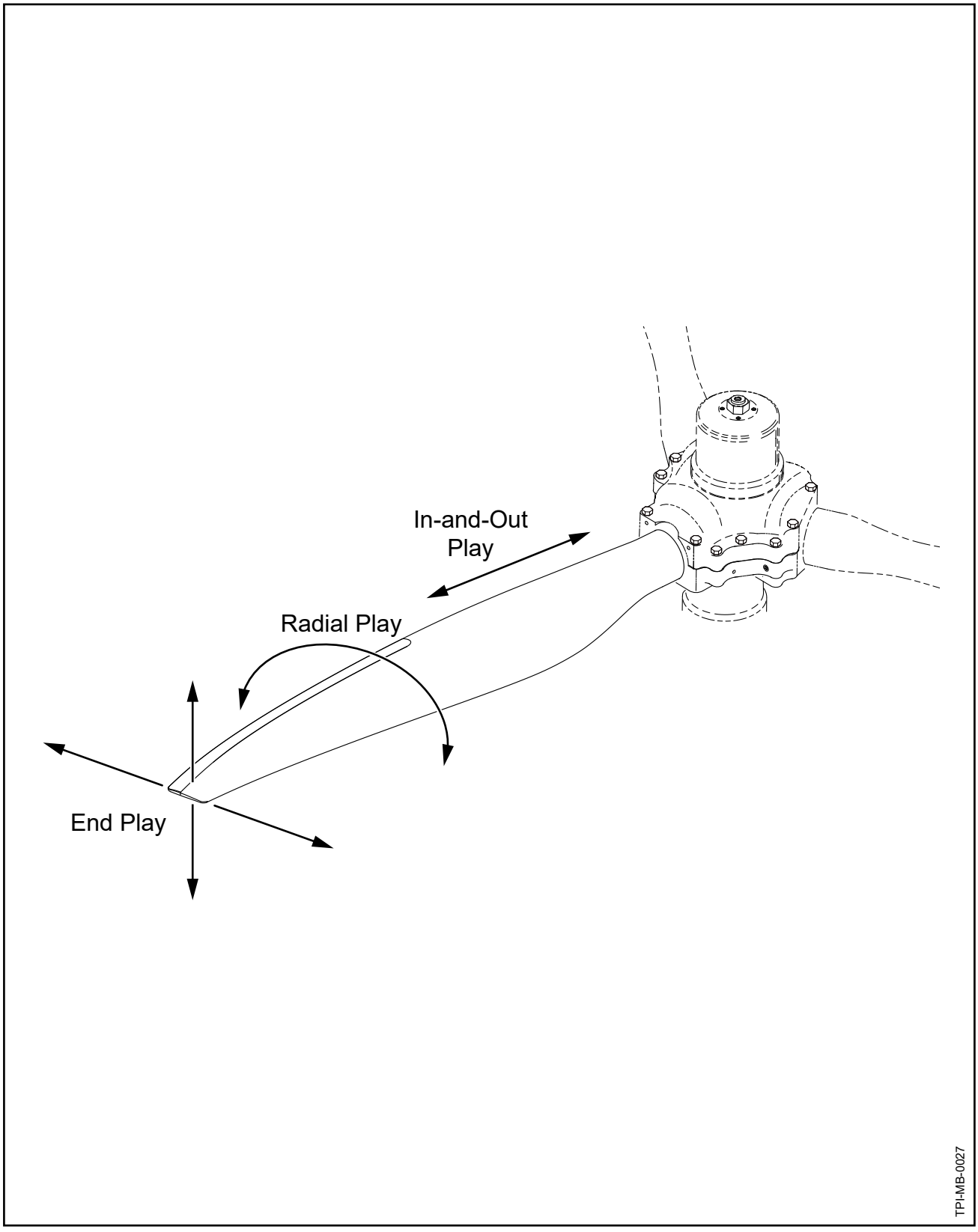
CAUTION 1: TORQUE VALUES ARE BASED ON NON-LUBRICATED THREADS, UNLESS SPECIFIED IN TABLE 8-1.

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. Wet torque denotes use of anti-seize compound CM118.

Item No.	Part Number	Description	Torque Ft-Lb	Torque In-Lb	Torque N•m
10	A-880-( )	Nut, Hex, Self-Locking, Thin/Piston	120	1440	162
140	B-3368	Nut, 5/16-24, Hex, Thin/Piston	10	120	13
340	B-6588-1	Fitting, Lubrication	Tighten Until Secure		
420	A-2043-1	Nut, 3/8-24, Hex, Self Locking/Clamp	35	420	47
440	A-321	Screw, 3/8-24 Double 60° Head/Clamp	40	480	54
540	B-854-( )	Cylinder	125-150	1500-1800	169-203
850	B-3384-( )	Bolt, 1/4-28, Hex Head/Bulkhead	8-10	96-120	11-13
1080	A-2038-( )	Screw, 1/4-28, Cap/Guide Collar	Tighten Until Secure		
1410	A-2016-( )	Bolt, 10-32, Hex Head/Start Lock Plate	4-6	48-72	6-8
Aluminum blade mounted in clamp			167	2004	226

Torque Values
Table 8-1



Blade Play
Figure 8-2

2. Blade Tolerances (Rev. 3)

A. Blade Play

(1) Limits for blade play are specified below. Refer to Figure 8-2.

(a)	End Play:	
	Leading Edge to Trailing Edge	0.125 inch (3.17 mm) total
	Fore-and-Aft (face to camber)	0.125 inch (3.17 mm) total
(b)	In-and-Out Play	0.032 inch (0.81 mm) total
(c)	Radial Play (pitch change)	±0.5 degree (1 degree total) measured at reference station

(2) Blades should be tight in the propeller; however, play that is within the allowable limits is acceptable if the blade returns to its original position when released.

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

B. Blade Track

(1)	Blade Track	0.125 inch (3.17 mm) total

C. Blade Pitch Tolerance

(1)	Blade pitch setting tolerance between blades at low pitch	0.2 degree

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SPECIAL TOOLS, FIXTURES, AND EQUIPMENT - CONTENTS

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1. Tooling and Facility Requirements (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.

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ILLUSTRATED PARTS LIST - CONTENTS

PROPELLER PARTS LISTS and FIGURES

SUB-ASSEMBLY PARTS LISTS and FIGURES

LIST OF FIGURES, CONTINUED

Clamp Assemblies, continued

Feathering Spring Assemblies

LIST OF FIGURES, CONTINUED

Start Lock Assemblies

Guide Collar Units

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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) Item Numbers that are listed but not shown in the illustration are identified by a dash to the left of the item number. (example: "-800")

(b) Alpha variants will be used to add additional items. There are two reasons for the use of alpha variants:

1 A part may have an alternate, or may be superseded, replaced, or obsoleted by another part.

a For example, the self-locking nut (A-2043) that is item 20 was superseded by the self-locking nut (A-2043-1) that is item 20A.

2 An Illustrated Parts List may contain multiple configurations. Effectivity codes are used to distinguish different part numbers within the same list.

a For example, one propeller configuration may use a mounting bolt (B-3339-1) that is item 30, yet another propeller configuration uses a mounting bolt (B-3347) that is item 30A. Effectivity codes are very important in the determination of parts in a given configuration.

B. Part Number

(1) The Part Number is the Hartzell Propeller 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-assembly.

(a) For example, a Fork Assembly that is part of a HC-C2YR-1 propeller assembly will have one bullet (•) before the description. This indicates that the Fork Assembly is part of the propeller assembly.

1 A Fork Bumper that is part of the Fork Assembly will appear directly below the Fork Assembly with two bullets (• •) before the description. This indicates that the Fork Bumper is part of the Fork Assembly - that is part of the Propeller Assembly.

a Example: HC-C2YR-1
• Fork Assembly
• • Fork Bumper

(3) If the description in this column includes a “PCP:” prefix, the part is classified as a Propeller Critical Part.

(4) If applicable, information regarding part alternatives, supersedures, replacements, or obsolescence will appear in the Description column.

(a) Refer to the section, “Description of Terms” in this chapter for definitions and requirements for part “alternates”, “supersedures”, etc.

(b) When part alternatives, supersedures, replacements, etc. are listed, the service document number related to the change may be included for reference.

(5) If applicable, vendor CAGE codes will be listed in the Description column.

D. Effectivity Code (EFF CODE)

(1) This column is used when additional information about a part is required.

(a) Effectivity codes can be used to identify parts that are only used on a particular model, or to direct the user to additional information in the “Effectivity” box at the bottom of the page.

(b) Whenever an effectivity code is present, refer to the “Effectivity” box at the bottom of the page for the applicable information.

(2) Parts common to all assembly models on the page show no effectivity code.

E. Units Per Assembly (UPA)

(1) Designates the total quantity of an item required for the next higher assembly or subassembly.

F. Overhaul (O/H)

(1) Designates the parts to be replaced at overhaul. A “Y” identifies the parts that must be replaced at overhaul.

NOTE: An overhaul kit may not contain all the parts identified with a “Y” for a particular model propeller. An example of parts that may not be included in the overhaul kit is spinner mounting parts.

G. Propeller Critical Part (PCP)

(1) This column identifies the Propeller Critical Parts (PCP) that are contained in each propeller model.

(a) Refer to the Introduction chapter of this manual for the definition of Propeller Critical Parts (PCP).

3. Description of Terms (Rev. 1)

A. Alternate

(1) Alternate parts are identified by the term “ALTERNATE” in the Description column. Alternate items are considered airworthy for continued flight and existing stock of parts may be used for maintenance and/or repair. The new or alternate part number may be used interchangeably when ordering/stocking new parts.

B. Supersedure

(1) Part changes are identified by the terms “SUPERSEDES ITEM _____” or “SUPERSEDED BY ITEM _____” in the Description column. Superseded items are considered airworthy for continued flight and existing stock of superseded parts may be used for maintenance and/or repair. Once the superseding part has been incorporated/installed into an assembly, the original superseded part may no longer be used. Superseded parts may no longer be available, and the new part number must be used when ordering/stocking new parts.

C. Replacement

(1) Part changes identified by the terms “REPLACES ITEM _____” or “REPLACED BY ITEM _____” in the Description column are considered airworthy for continued flight, but must be replaced with a part with the new part number at overhaul. Existing stock of replaced parts may not be used for maintenance and/or repair of effected assemblies. Replaced parts may no longer be available, and the new part number must be used when ordering/stocking new parts.

D. Obsolete

(1) Obsolete parts are identified by “OBS” in the Units Per Assembly (UPA) column. Obsolete items are considered unairworthy for continued flight.

4. Vendor Supplied Hardware (Rev. 1)

A. Important Information

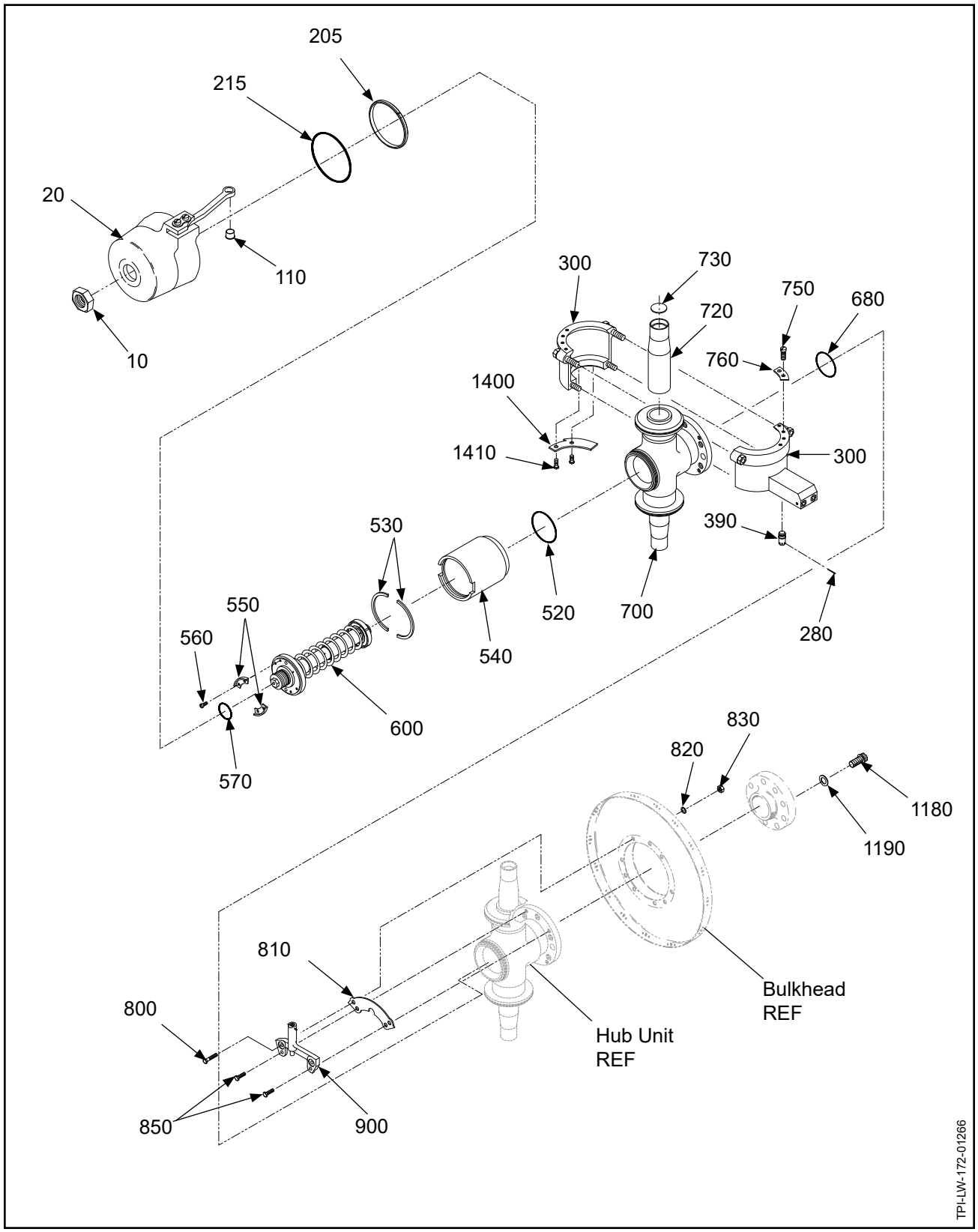
(1) Many O-rings, fasteners, and other vendor supplied hardware listed in Hartzell Propeller Inc. manuals have previously been specified with AN, MS, NAS, or vendor part number. To provide internal controls and procurement flexibility, Hartzell part numbers have been assigned to all O-rings, fasteners, 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.



HC-A2VF-2, -2A, -2B: Propeller Parts
Figure 10-1

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-1		**PROPELLER PARTS - HC-A2VF-2, -2A, -2B**				
10	A-880-2	• NUT, HEX, SELF-LOCKING, THIN		1	Y	
20	832-24	• PISTON ASSEMBLY (REFER TO “832-24 PISTON ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
110	A-944	• SLEEVE, LINKSCREW		2	Y	
205	B-1843	• SEAL, DUST, PISTON		1	Y	
215	C-3317-343-1	• O-RING, PISTON		1	Y	
280	B-3838-3-3	• COTTER PIN		2	Y	
300	838-10	• CLAMP ASSEMBLY “V” SERIES (REFER TO “838-10: PCP: CLAMP ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		2		
-385	A-6119	• BUSHING, LINK ARM - OPTIONAL		2	Y	
390	A-304	• LINKSCREW, 1/2-20		2	Y	
520	C-3317-235	• O-RING, CYLINDER		1	Y	
530	A-859	• KEEPER, SPLIT, FRONT		1		
540	B-854	• CYLINDER		1		
550	A-899-( )	• SPACER, STOP, PITCH		2		
560	B-3840-6	• SCREW, 10-32, FILLISTER HEAD		4	Y	
570	C-3317-024	• O-RING, PITCH CHANGE ROD		1	Y	
600	831-1A	• FEATHERING SPRING ASSEMBLY (REFER TO “838-1A: FEATHERING SPRING ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	-2A	1		
	831-5A	• FEATHERING SPRING ASSEMBLY (REFER TO “838-5A: FEATHERING SPRING ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	-2, -2B	1		
680	C-3317-228	• O-RING, HUB MOUNTING		1	Y	
700	840-95	• PCP: HUB UNIT, HC-A2_F-		R/F		PCP
720	A-1496	• • PILOT TUBE, REPLACED BY ITEM 720A		2		
720A	C-7080-( )	• • PILOT TUBE, REPLACES ITEM 720		2		
730	B-7070-17	• • PLUG, CUPPED, STEEL - USED WITH ITEM 720A		2	Y	
750	B-3840-( )	• SCREW, 10-32, FILLISTER HEAD		A/R	Y	
760	A-48	• BALANCE WEIGHT		A/R		
-770	B-6138-8-8	• DOWEL PIN		2	Y	
800	B-3875-18H	• BOLT, 5/19-24, HEX HEAD		4	Y	
810	A-1338-1	• BRACKET, SPINNER SUPPORT	-2B	2		
820	B-3851-0532	• WASHER	-2B	4	Y	
830	B-3882-524	• NUT, HEX,THIN, SELF-LOCKING	-2B	4	Y	
830A	B-3808-5	• NUT, HEX, SELF-LOCKING - ALTERNATE FOR ITEM 830	-2B	4	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL
-2	HC-A2VF-2		
-2A	HC-A2VF-2A		
-2B	HC-A2VF-2B		

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-1		**PROPELLER PARTS - HC-A2VF-2, -2A, -2B - CONTINUED**				
850	B-3385-4H	• BOLT, 5/16-24, HEX HEAD		4	Y	
900	830-2A	• START LOCK ASSEMBLY (REFER TO “830-2A: START LOCK ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	-2, -2A	2		
	830-12	• START LOCK ASSEMBLY (REFER TO “830-12: START LOCK ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	-2B	2		
1180	A-2040	• BOLT, 1/2-20, HEX HEAD, REPLACED BY ITEM 1180B			Y	
1180A	A-1333-4	• BOLT, MOUNTING,1/2-20, HEX HEAD - ALTERNATE FOR ITEM 1180, REPLACED BY ITEM 1180B			Y	
1180B	A-1328-1	• BOLT, MOUNTING, 1/2-20, 12 POINT, REPLACES ITEMS 1180 AND ITEM 1180A		6	Y	
1190	A-1381	• WASHER, 1/2”, CRES.		6	Y	
1400	A-881	• PLATE, START LOCK		2		
1400A	A-881-2	• PLATE, START LOCK - ALTERNATE FOR ITEM 1400		2		
1410	B-3840-5	• SCREW, 10-32, FILLISTER HEAD		4	Y	
		BLADE RETENTION PARTS (REFER TO “BLADE RETENTION PARTS” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)				
		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				

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL
-2	HC-A2VF-2		
-2A	HC-A2VF-2A		
-2B	HC-A2VF-2B		

- ITEM NOT ILLUSTRATED

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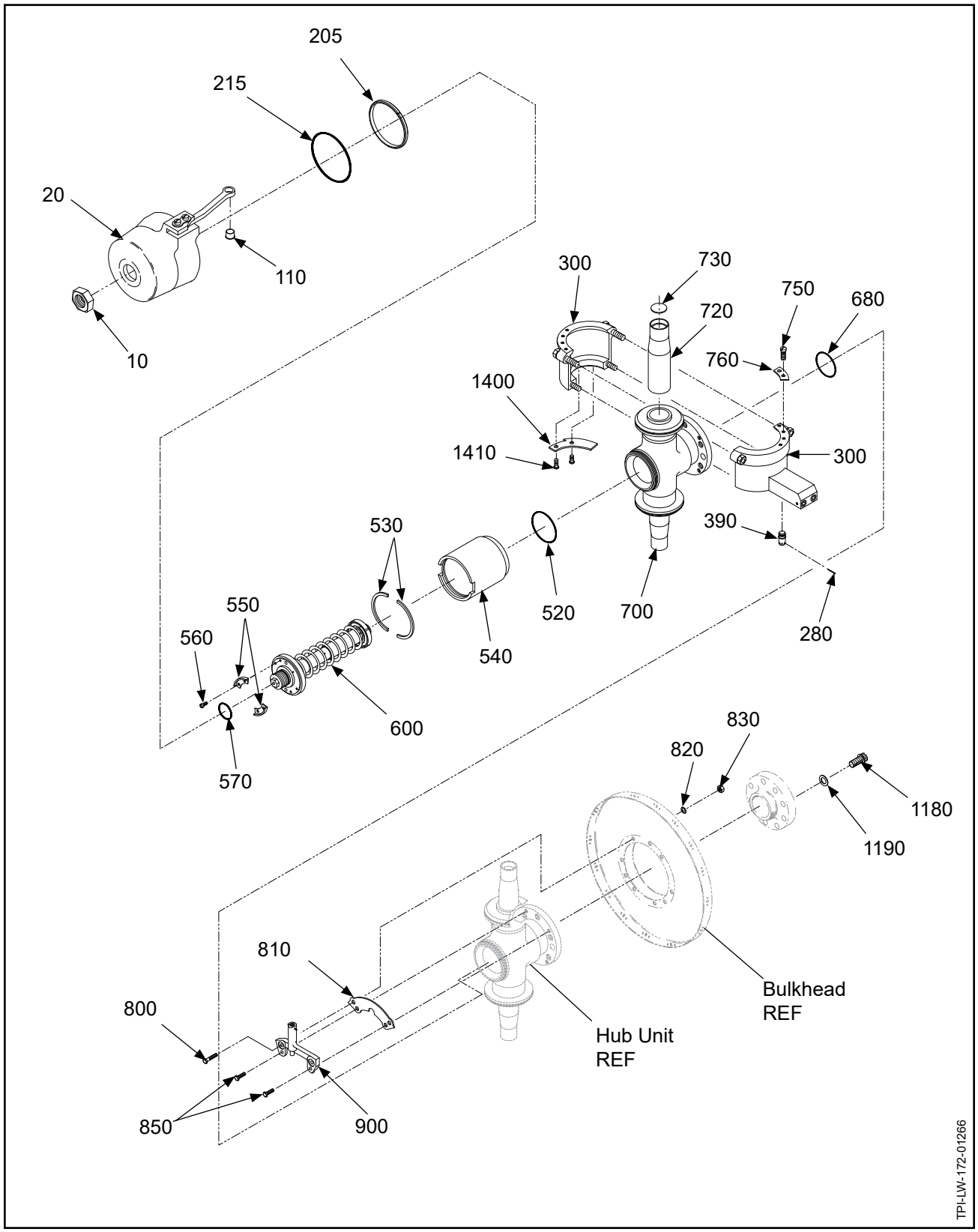

HC-A2MVF-2, -2A, -2B: Propeller Parts
Figure 10-2

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-2		**PROPELLER PARTS - HC-A2MVF-2, -2A, -2B**				
10	A-880-2	• NUT, HEX, SELF-LOCKING, THIN		1	Y	
20	832-24	• PISTON ASSEMBLY (REFER TO “832-24 PISTON ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
110	A-944	• SLEEVE, LINKSCREW		2	Y	
205	B-1843	• SEAL, DUST, PISTON		1	Y	
215	C-3317-343-1	• O-RING, PISTON		1	Y	
280	B-3838-3-3	• COTTER PIN		2	Y	
300	838-1010	• PCP: CLAMP ASSEMBLY, “MV” SERIES - (REFER TO “838-1010: PCP: CLAMP ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		2		PCP
-385	A-6119	• BUSHING, LINK ARM - OPTIONAL		2	Y	
390	A-304	• LINKSCREW, 1/2-20		2	Y	
520	C-3317-235	• O-RING, CYLINDER		1	Y	
530	A-859	• KEEPER, SPLIT, FRONT		1		
540	B-854	• CYLINDER		1		
550	A-899-( )	• SPACER, STOP, PITCH		2		
560	B-3840-6	• SCREW, 10-32, FILLISTER HEAD		4	Y	
570	C-3317-024	• O-RING, PITCH CHANGE ROD		1	Y	
600	831-1A	• FEATHERING SPRING ASSEMBLY (REFER TO “838-1A: FEATHERING SPRING ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	-2A	1		
	831-5A	• FEATHERING SPRING ASSEMBLY (REFER TO “838-5A: FEATHERING SPRING ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	-2, -2B	1		
680	C-3317-228	• O-RING, HUB MOUNTING		1	Y	
700	840-95	• PCP: HUB UNIT, HC-A2_F-		R/F		PCP
720	A-1496	• •PILOT TUBE, REPLACED BY ITEM 720A		2		
720A	C-7080-( )	• •PILOT TUBE, REPLACES ITEM 720		2		
730	B-7070-17	• •PLUG, CUPPED, STEEL - USED WITH ITEM 720A		2	Y	
750	B-3840-( )	• SCREW, 10-32, FILLISTER HEAD		A/R	Y	
760	A-48	• BALANCE WEIGHT		A/R		
-770	B-6138-8-8	• DOWEL PIN		2	Y	
800	B-3875-18H	• BOLT, 5/19-24, HEX HEAD		4	Y	
810	A-1338-1	• BRACKET, SPINNER SUPPORT	-2B	2		
820	B-3851-0532	• WASHER	-2B	4	Y	
830	B-3882-524	• NUT, HEX,THIN, SELF-LOCKING	-2B	4	Y	
830A	B-3808-5	• NUT, HEX, SELF-LOCKING - ALTERNATE FOR ITEM 830	-2B	4	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL
-2	HC-A2MVF-2		
-2A	HC-A2MVF-2A		
-2B	HC-A2MVF-2B		

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-2		**PROPELLER PARTS - HC-A2MVF-2, -2A, -2B - CONTINUED**				
850	B-3385-4H	• BOLT, 5/16-24, HEX HEAD		4	Y	
900	830-2A	• START LOCK ASSEMBLY (REFER TO “830-2A: START LOCK ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	-2, -2A	1		
	830-12	• START LOCK ASSEMBLY (REFER TO “830-12: START LOCK ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	-2, -2B	1		
1180	A-2040	• BOLT, 1/2-20, HEX HEAD, REPLACED BY ITEM 1180B			Y	
1180A	A-1333-4	• BOLT, MOUNTING,1/2-20, HEX HEAD - ALTERNATE FOR ITEM 1180, REPLACED BY ITEM 1180B			Y	
1180B	A-1328-1	• BOLT, MOUNTING, 1/2-20, 12 POINT - REPLACES ITEMS 1180 AND ITEM 1180A		6	Y	
1190	A-1381	• WASHER, 1/2”, CRES.		6	Y	
1400	A-881	• PLATE, START LOCK		2		
1400A	A-881-2	• PLATE, START LOCK - ALTERNATE FOR ITEM 1400		2		
1410	B-3840-5	• SCREW, 10-32, FILLISTER HEAD		4	Y	
		BLADE RETENTION PARTS (REFER TO “BLADE RETENTION PARTS” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)				
		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				

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL
-2	HC-A2MVF-2		
-2A	HC-A2MVF-2A		
-2B	HC-A2MVF-2B		

- ITEM NOT ILLUSTRATED

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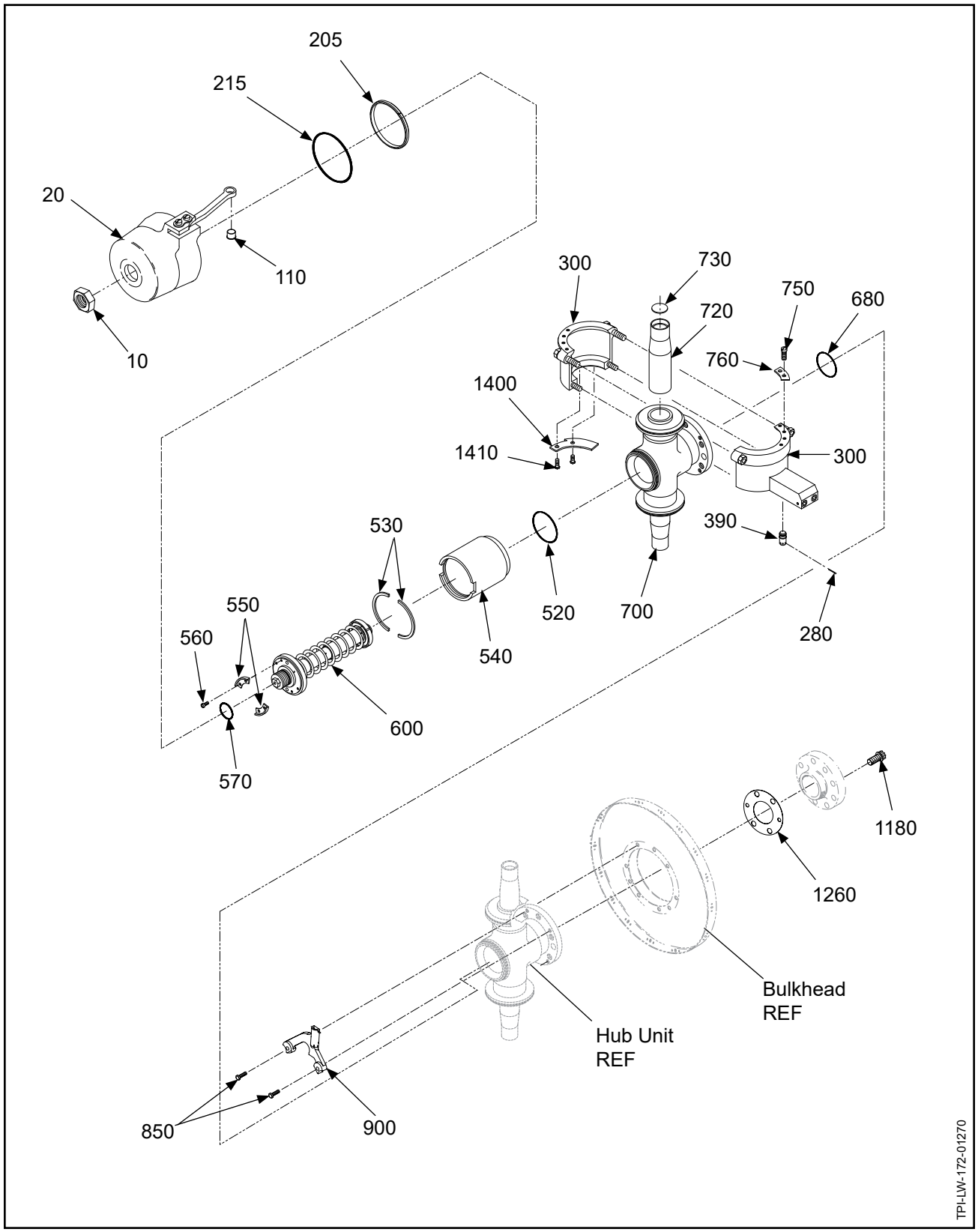

HC-A2VK-2: Propeller Parts
Figure 10-3

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-3		**PROPELLER PARTS - HC-A2VK-2**				
10	A-880-2	• NUT, HEX, SELF-LOCKING, THIN		1	Y	
20	832-24	• PISTON ASSEMBLY (REFER TO "832-24 PISTON ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
110	A-944	• SLEEVE, LINKSCREW		2	Y	
205	B-1843	• SEAL, DUST, PISTON		1	Y	
215	C-3317-343-1	• O-RING, PISTON		1	Y	
280	B-3838-3-3	• COTTER PIN		2	Y	
290	A-971-B	• RACE, OUTBOARD		2		
300	838-10	• CLAMP ASSEMBLY "V" SERIES (REFER TO "838-10: PCP: CLAMP ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		2		
-385	A-6119	• BUSHING, LINK ARM - OPTIONAL		2	Y	
390	A-304	• LINKSCREW, 1/2-20		2	Y	
520	C-3317-235	• O-RING, CYLINDER		1	Y	
530	A-859	• KEEPER, SPLIT, FRONT		1		
540	B-854	• CYLINDER		1		
550	A-899-( )	• SPACER, STOP, PITCH		2		
560	B-3840-( )	• SCREW, 10-32, FILLISTER HEAD		4	Y	
570	C-3317-024	• O-RING, PITCH CHANGE ROD		1	Y	
600	831-5A	• FEATHERING SPRING ASSEMBLY (REFER TO "838-5A: FEATHERING SPRING ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
680	C-3317-329	• O-RING, HUB MOUNTING		1	Y	
700	840-96	• PCP: HUB UNIT/ASSY, HC-A2_ _-		1		PCP
720	A-1496	• •PILOT TUBE, REPLACED BY ITEM 720A		2		
720A	C-7080-( )	• •PILOT TUBE, REPLACES ITEM 720		2		
730	B-7070-17	• •PLUG, CUPPED, STEEL - USED WITH ITEM 720A		2	Y	
750	B-3840-( )	• SCREW, 10-32, FILLISTER HEAD		A/R	Y	
760	A-48	• BALANCE WEIGHT		A/R		
850	B-3384-4H	• BOLT, 1/4-28, HEX HEAD		4	Y	
-890	A-1333	• BOLT, MOUNTING,1/2-20, HEX HEAD		2	Y	
-890A	A-1333-3	• BOLT, MOUNTING,1/2-20, HEX HEAD - ALTERNATE FOR ITEM 890		2	Y	
900	830-9A	• START LOCK ASSEMBLY (REFER TO "830-9A: START LOCK ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
1180	A-1328	• BOLT, MOUNTING, 1/2-20, 12 POINT		4	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-3		**PROPELLER PARTS - HC-A2VK-2 - CONTINUED**				
1260	B-1322	• SHIM, MOUNTING, “K” FLANGE		1	Y	
1400	A-881	• PLATE, START LOCK		2		
1400A	A-881-2	• PLATE, START LOCK - ALTERNATE FOR ITEM 1400		2		
1410	B-3840-( )	• SCREW, 10-32, FILLISTER HEAD		4	Y	
		BLADE RETENTION PARTS				
		(REFER TO “BLADE RETENTION PARTS” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)				
		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				

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

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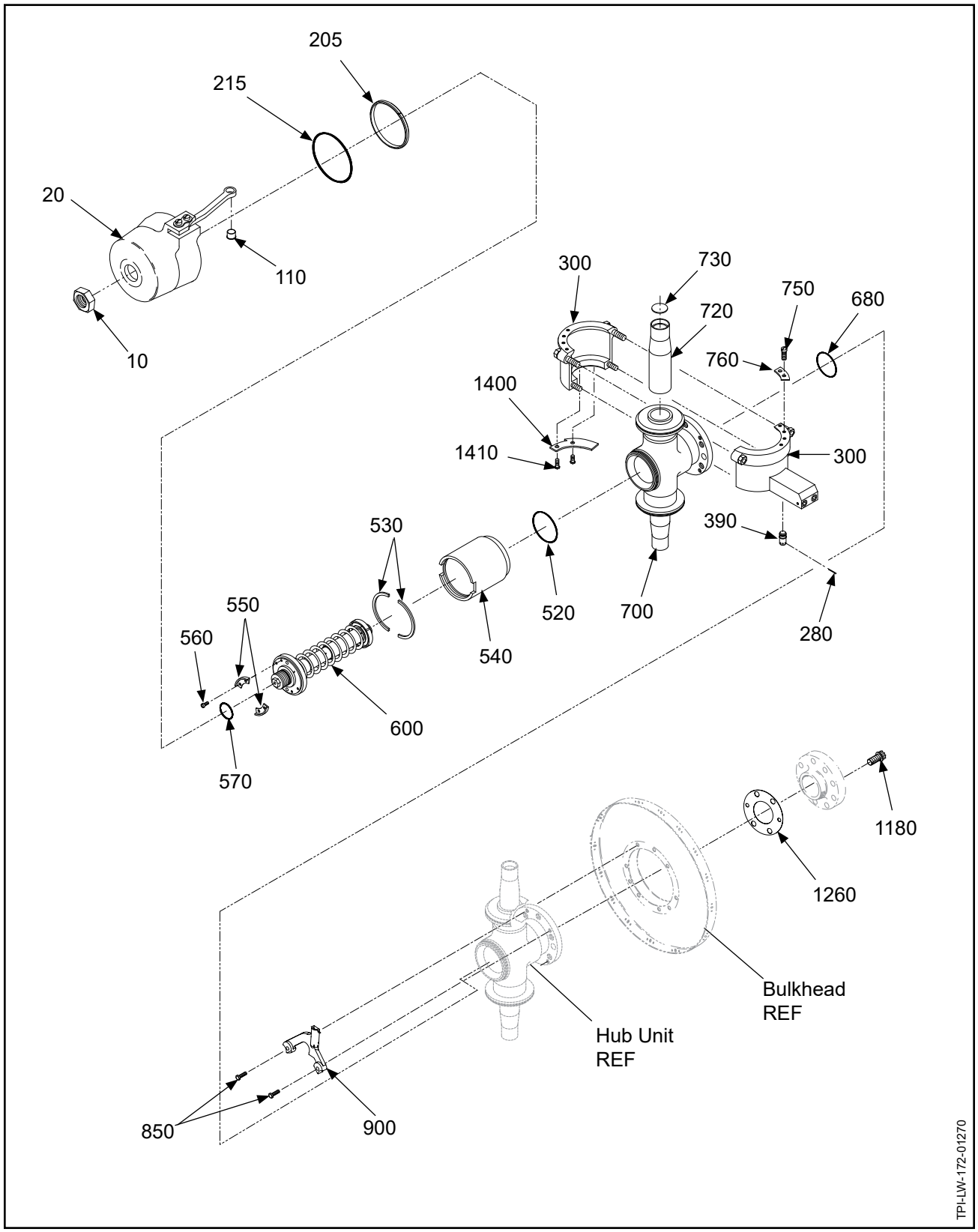

HC-A2MVK-2: Propeller Parts
Figure 10-4

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-4		**PROPELLER PARTS - HC-A2MVK-2**				
10	A-880-2	• NUT, HEX, SELF-LOCKING, THIN		1	Y	
20	832-24	• PISTON ASSEMBLY (REFER TO "832-24 PISTON ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
110	A-944	• SLEEVE, LINKSCREW		2	Y	
205	B-1843	• SEAL, DUST, PISTON		1	Y	
215	C-3317-343-1	• O-RING, PISTON		1	Y	
280	B-3838-3-3	• COTTER PIN		2	Y	
300	838-1010	• PCP: CLAMP ASSEMBLY, "MV" SERIES - (REFER TO "838-1010: PCP: CLAMP ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		2		PCP
-385	A-6119	• BUSHING, LINK ARM - OPTIONAL		2	Y	
390	A-304	• LINKSCREW, 1/2-20		2	Y	
520	C-3317-235	• O-RING, CYLINDER		1	Y	
530	A-859	• KEEPER, SPLIT, FRONT		1		
540	B-854	• CYLINDER		1		
550	A-899-( )	• SPACER, STOP, PITCH		2		
560	B-3840-( )	• SCREW, 10-32, FILLISTER HEAD		4	Y	
570	C-3317-024	• O-RING, PITCH CHANGE ROD		1	Y	
600	831-5A	• FEATHERING SPRING ASSEMBLY (REFER TO "838-5A: FEATHERING SPRING ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
680	C-3317-329	• O-RING, HUB MOUNTING		1	Y	
700	840-96	• PCP: HUB UNIT/ASSY, HC-A2_ _-		1		PCP
720	A-1496	• •PILOT TUBE, REPLACED BY ITEM 720A		2		
720A	C-7080-( )	• •PILOT TUBE, REPLACES ITEM 720		2		
730	B-7070-17	• •PLUG, CUPPED, STEEL - USED WITH ITEM 720A		2	Y	
750	B-3840-( )	• SCREW, 10-32, FILLISTER HEAD		A/R	Y	
760	A-48	• BALANCE WEIGHT		A/R		
850	B-3384-4H	• BOLT, 1/4-28, HEX HEAD		4	Y	
-890	A-1333	• BOLT, MOUNTING,1/2-20, HEX HEAD		2	Y	
-890A	A-1333-3	• BOLT, MOUNTING,1/2-20, HEX HEAD - ALTERNATE FOR ITEM 890		2	Y	
900	830-9A	• START LOCK ASSEMBLY (REFER TO "830-9A: START LOCK ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		2		

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-4		**PROPELLER PARTS- HC-A2VK-2 - CONTINUED**				
1180	A-1328	• BOLT, MOUNTING, 1/2-20, 12 POINT		4	Y	
1260	B-1322	• SHIM, MOUNTING, “K” FLANGE		1	Y	
1400	A-881	• PLATE, START LOCK		2		
1400A	A-881-2	• PLATE, START LOCK - ALTERNATE FOR ITEM 1400		2		
1410	B-3840-( )	• SCREW, 10-32, FILLISTER HEAD		4	Y	
		BLADE RETENTION PARTS				
		(REFER TO “BLADE RETENTION PARTS” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)				
		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				

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

HC-A2MVK-2

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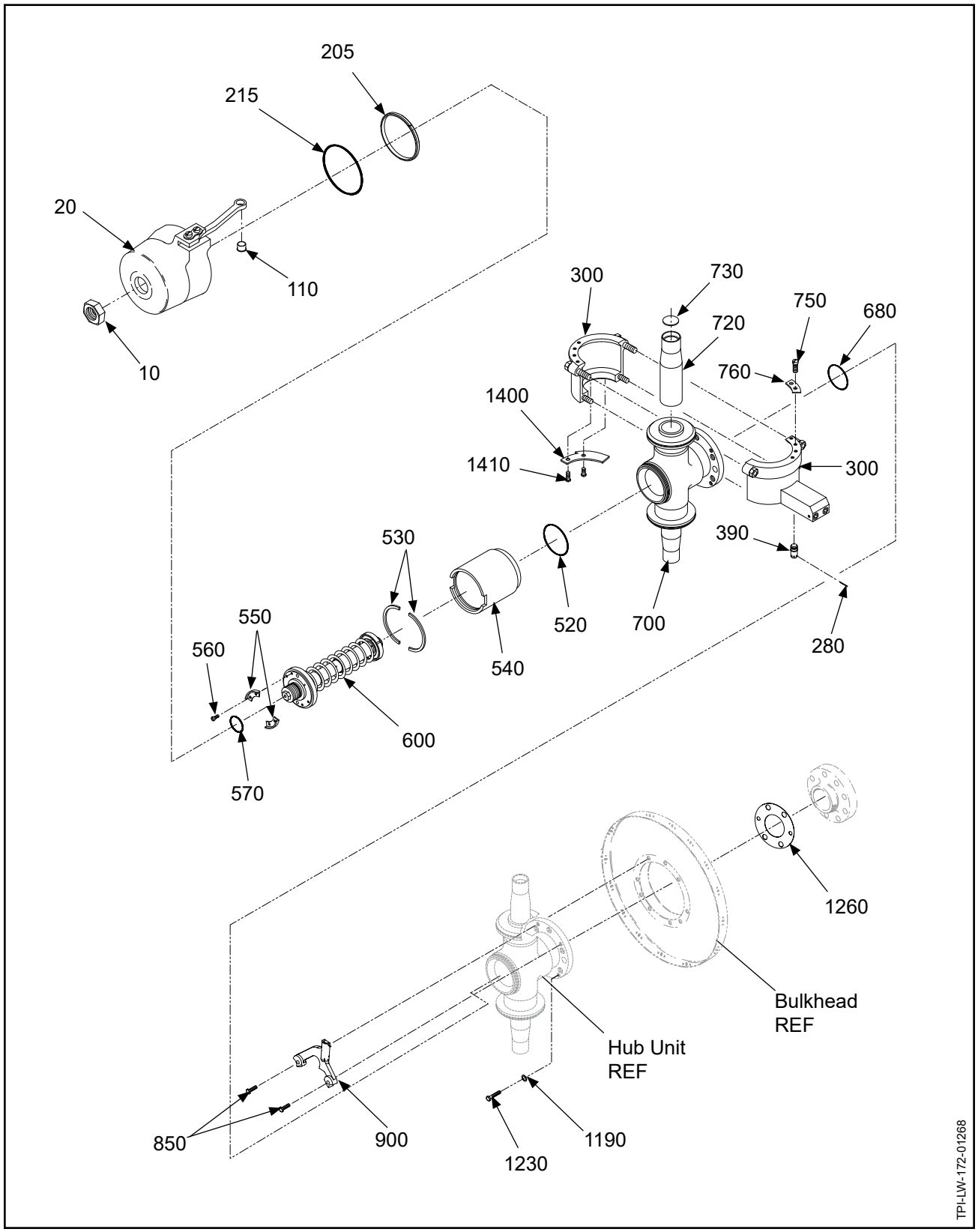

HC-A2VL-2: Propeller Parts
Figure 10-5

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-5		**PROPELLER PARTS - HC-A2VL-2**				
10	A-880-2	• NUT, HEX, SELF-LOCKING, THIN		1	Y	
20	832-24	• PISTON ASSEMBLY (REFER TO "832-24 PISTON ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
110	A-944	• SLEEVE, LINKSCREW		2	Y	
205	B-1843	• SEAL, DUST, PISTON		1	Y	
215	C-3317-343-1	• O-RING, PISTON		1	Y	
280	B-3838-3-3	• COTTER PIN		2	Y	
300	838-11	• PCP: CLAMP ASSEMBLY, "V" SERIES - (REFER TO "838-11: PCP: CLAMP ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		2		PCP
-385	A-6119	• BUSHING, LINK ARM - OPTIONAL		2	Y	
390	A-304	• LINKSCREW, 1/2-20		2	Y	
520	C-3317-235	• O-RING, CYLINDER		1	Y	
530	A-859	• KEEPER, SPLIT, FRONT		1		
540	B-854	• CYLINDER		1		
550	A-899-( )	• SPACER, STOP, PITCH		2		
560	B-3840-( )	• SCREW, 10-32, FILLISTER HEAD		4	Y	
570	C-3317-024	• O-RING, PITCH CHANGE ROD		1	Y	
600	831-5A	• FEATHERING SPRING ASSEMBLY (REFER TO "838-9: FEATHERING SPRING ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
680	C-3317-329	• O-RING, HUB MOUNTING		1	Y	
700	840-97	• PCP: HUB UNIT/ASSY, HC-A2_ _-		1		PCP
720	A-1496	• •PILOT TUBE, REPLACED BY ITEM 720A		2		
720A	C-7080-( )	• •PILOT TUBE, REPLACES ITEM 720		2		
730	B-7070-17	• •PLUG, CUPPED, STEEL - USED WITH ITEM 720A		2	Y	
750	B-3840-( )	• SCREW, 10-32, FILLISTER HEAD		A/R	Y	
760	A-48	• BALANCE WEIGHT		A/R		
850	B-3384-4H	• BOLT, 1/4-28, HEX HEAD		4	Y	
900	830-9	• START LOCK ASSEMBLY (REFER TO "830-9: START LOCK ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		2		
1190	B-6527-7	• WASHER		4	Y	
1230	B-6489-25	• BOLT, 7/16-20, HEX HEAD, MOUNTING		4	Y	
-1240	B-6329-7	• WASHER, COUNTERSUNK		2	Y	
-1250	B-6489-20	• BOLT, 7/16-20, HEX HEAD, MOUNTING		2	Y	
1260	B-933-1	• SHIM, MOUNTING, PROPELLER		2	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

HC-A2VL-2

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-5		**PROPELLER PARTS - HC-A2VL-2 - CONTINUED**				
1400	A-881	• PLATE, START LOCK		2		
1400A	A-881-2	• PLATE, START LOCK - ALTERNATE FOR ITEM 1400		2		
1410	B-3840-( )	• SCREW, 10-32, FILLISTER HEAD		4	Y	
		BLADE RETENTION PARTS				
		(REFER TO “BLADE RETENTION PARTS” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)				
		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				

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

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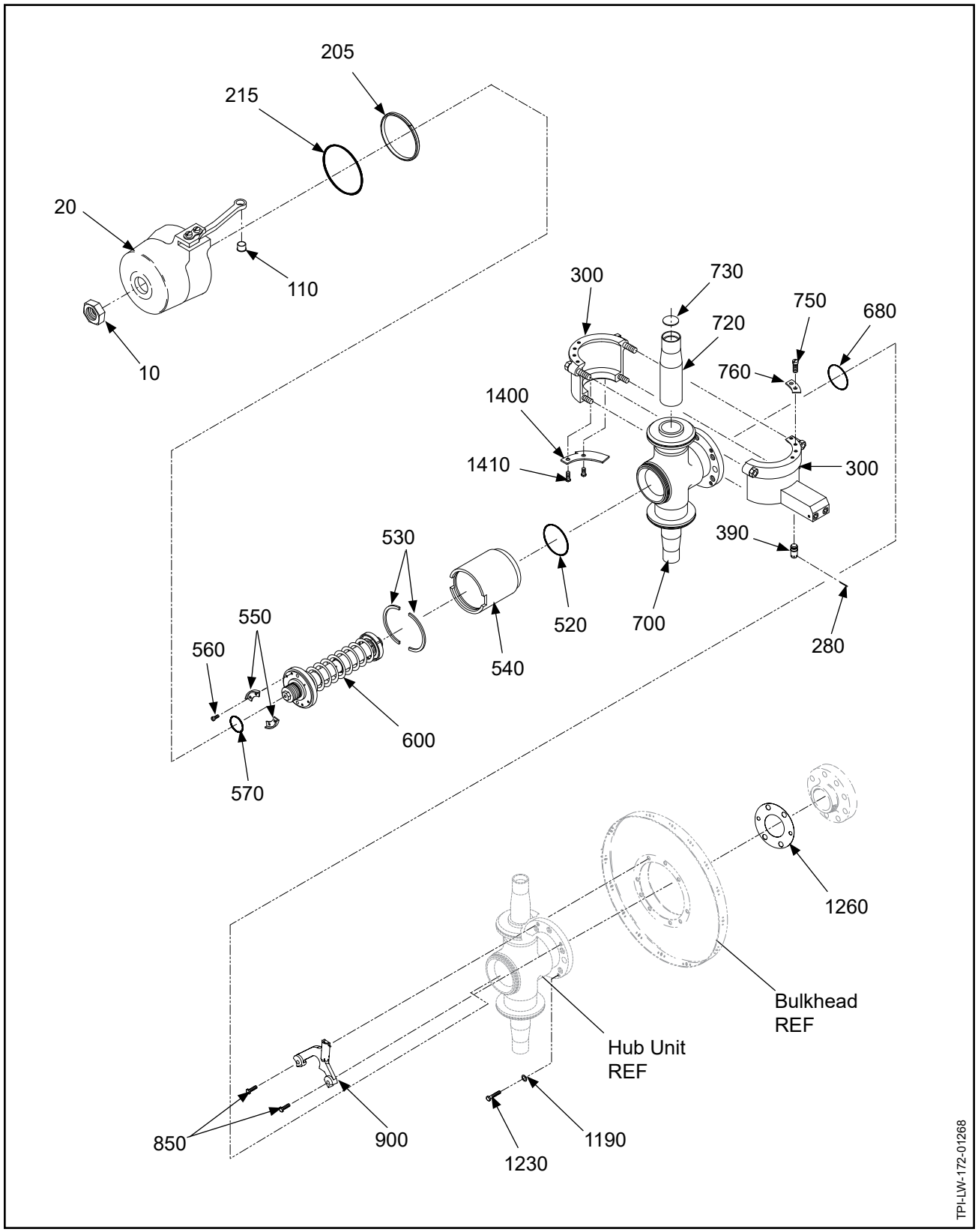

HC-A2MVL-2: Propeller Parts
Figure 10-6

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-6		**PROPELLER PARTS - HC-A2MVL-2**				
10	A-880-2	• NUT, HEX, SELF-LOCKING, THIN		1	Y	
20	832-24	• PISTON ASSEMBLY (REFER TO "832-24 PISTON ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
110	A-944	• SLEEVE, LINKSCREW		2	Y	
205	B-1843	• SEAL, DUST, PISTON		1	Y	
215	C-3317-343-1	• O-RING, PISTON		1	Y	
280	B-3838-3-3	• COTTER PIN		2	Y	
300	838-1011	• PCP: CLAMP ASSEMBLY, "V" SERIES - (REFER TO "838-11: PCP: CLAMP ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		2		PCP
-385	A-6119	• BUSHING, LINK ARM - OPTIONAL		2	Y	
390	A-304	• LINKSCREW, 1/2-20		2	Y	
520	C-3317-235	• O-RING, CYLINDER		1	Y	
530	A-859	• KEEPER, SPLIT, FRONT		1		
540	B-854	• CYLINDER		1		
550	A-899-( )	• SPACER, STOP, PITCH		2		
560	B-3840-( )	• SCREW, 10-32, FILLISTER HEAD		4	Y	
570	C-3317-024	• O-RING, PITCH CHANGE ROD		1	Y	
600	831-5A	• FEATHERING SPRING ASSEMBLY (REFER TO "838-9: FEATHERING SPRING ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
680	C-3317-329	• O-RING, HUB MOUNTING		1	Y	
700	840-97	• PCP: HUB UNIT/ASSY, HC-A2_ _-		1		PCP
720	A-1496	• •PILOT TUBE, REPLACED BY ITEM 720A		2		
720A	C-7080-( )	• •PILOT TUBE, REPLACES ITEM 720		2		
730	B-7070-17	• •PLUG, CUPPED, STEEL - USED WITH ITEM 720A		2	Y	
750	B-3840-( )	• SCREW, 10-32, FILLISTER HEAD		A/R	Y	
760	A-48	• BALANCE WEIGHT		A/R		
850	B-3384-4H	• BOLT, 1/4-28, HEX HEAD		4	Y	
900	830-9	• START LOCK ASSEMBLY (REFER TO "830-9: START LOCK ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		2		
1190	B-6527-7	• WASHER		4	Y	
1230	B-6489-25	• BOLT, 7/16-20, HEX HEAD, MOUNTING		4	Y	
-1240	B-6329-7	• WASHER, COUNTERSUNK		2	Y	
-1250	B-6489-20	• BOLT, 7/16-20, HEX HEAD, MOUNTING		2	Y	
1260	B-933-1	• SHIM, MOUNTING, PROPELLER		2	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-6		**PROPELLER PARTS - HC-A2MVL-2 - CONTINUED**				
1400	A-881	• PLATE, START LOCK		2		
1400A	A-881-2	• PLATE, START LOCK - ALTERNATE FOR ITEM 1400		2		
1410	B-3840-( )	• SCREW, 10-32, FILLISTER HEAD		4	Y	
		BLADE RETENTION PARTS				
		(REFER TO "BLADE RETENTION PARTS" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)				
		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				

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

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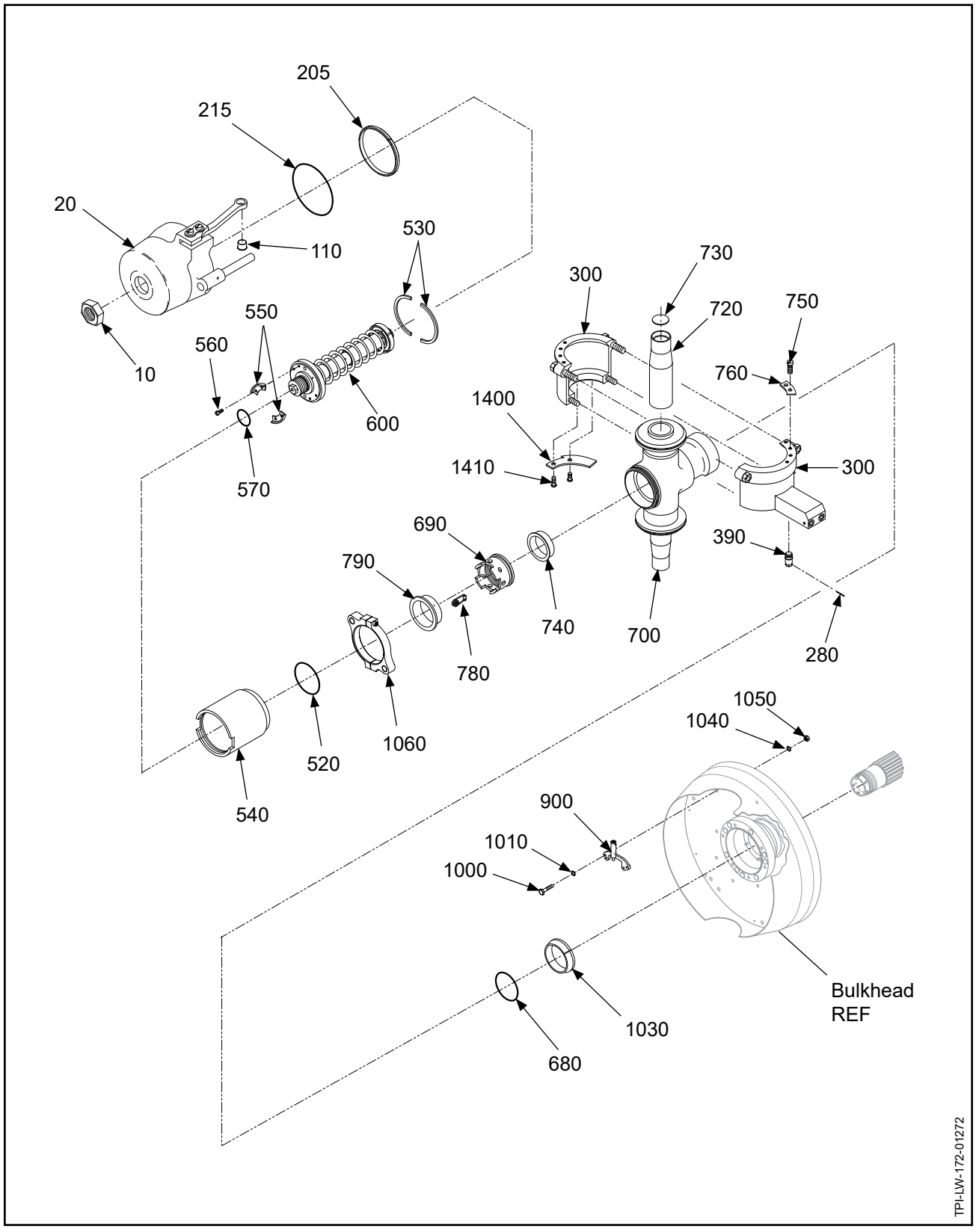

HC-A2V20-2: Propeller Parts
Figure 10-7

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-7		**PROPELLER PARTS - HC-A2V20-2**				
10	A-880-1	• NUT, HEX, SELF-LOCKING, THIN		1	Y	
20	832-26	• PISTON ASSEMBLY (REFER TO "832-26 PISTON ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
110	A-944	• SLEEVE, LINKSCREW		2	Y	
205	B-1843	• SEAL, DUST, PISTON		1	Y	
215	C-3317-343-1	• O-RING, PISTON		1	Y	
280	B-3838-3-3	• COTTER PIN, LINKSCREW		2	Y	
300	838-6	• CLAMP ASSEMBLY "V" SERIES (REFER TO "838-6: PCP: CLAMP ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		2		
-385	A-6119	• BUSHING, LINK ARM - OPTIONAL		2	Y	
390	A-304	• LINKSCREW, 1/2-20		2	Y	
520	C-3317-235	• O-RING, CYLINDER		1	Y	
530	A-859	• KEEPER, SPLIT, FRONT		1		
540	B-854	• CYLINDER		1		
550	A-899-( )	• SPACER, STOP, PITCH		2		
560	B-3840-( )	• SCREW, 10-32, FILLISTER HEAD		4	Y	
570	C-3317-020	• O-RING, PITCH CHANGE ROD		1	Y	
600	831-84	• FEATHERING SPRING ASSEMBLY (REFER TO "838-84: FEATHERING SPRING ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
680	C-3317-229	• O-RING, HUB MOUNTING		1	Y	
690	A-63B	• PCP: NUT, SHAFT, 20 SPLINE - USE WITH ITEM 790 SUPERSEDED BY ITEM 690A		1		PCP
690A	B-2063	• PCP: NUT, SHAFT, 20 SPLINE - USE WITH ITEM 790 SUPERSEDES ITEM 690		1		PCP
700	840-94	• PCP: HUB UNIT HC-A2_20-		1		PCP
720	A-1496	• •PILOT TUBE, REPLACED BY ITEM 720A		2		
720A	C-7080-( )	• •PILOT TUBE, REPLACES ITEM 720		2		
730	B-7070-17	• •PLUG, CUPPED, STEEL - USED WITH ITEM 720A		2	Y	
740	A-155	• •HUB BUSHING, SHAFT		1		
750	B-3840-( )	• SCREW, 10-32, FILLISTER HEAD		A/R	Y	
760	A-48	• BALANCE WEIGHT		A/R		
780	A-847	• SAFETY PIN, SHAFT NUT		1	Y	
790	A-870	• RING, PULLER, HUB - USE WITH ITEM 690		1		

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-7		**PROPELLER PARTS - HC-A2V20-2 - CONTINUED**				
900	830-2	• START LOCK ASSEMBLY (REFER TO “830-2: START LOCK ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		2		
1000	B-3384-18	• BOLT, 1/4-28, HEX HEAD		4	Y	
1010	B-3851-0463	• WASHER		4	Y	
1030	A-50-3	• CONE, MOUNTING, REAR, 20 SPLINE		1		
1040	B-3851-0432	• WASHER		4	Y	
1050	B-3808-4	• NUT, HEX, SELF-LOCKING		4	Y	
1060	834-2A	• GUIDE COLLAR UNIT (REFER TO “834-2A: GUIDE COLLAR UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
1400	A-881	• PLATE, START LOCK		2		
1410	B-3840-5	• SCREW, 10-32, FILLISTER HEAD		4	Y	
		BLADE RETENTION PARTS (REFER TO “BLADE RETENTION PARTS” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)				
		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				

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

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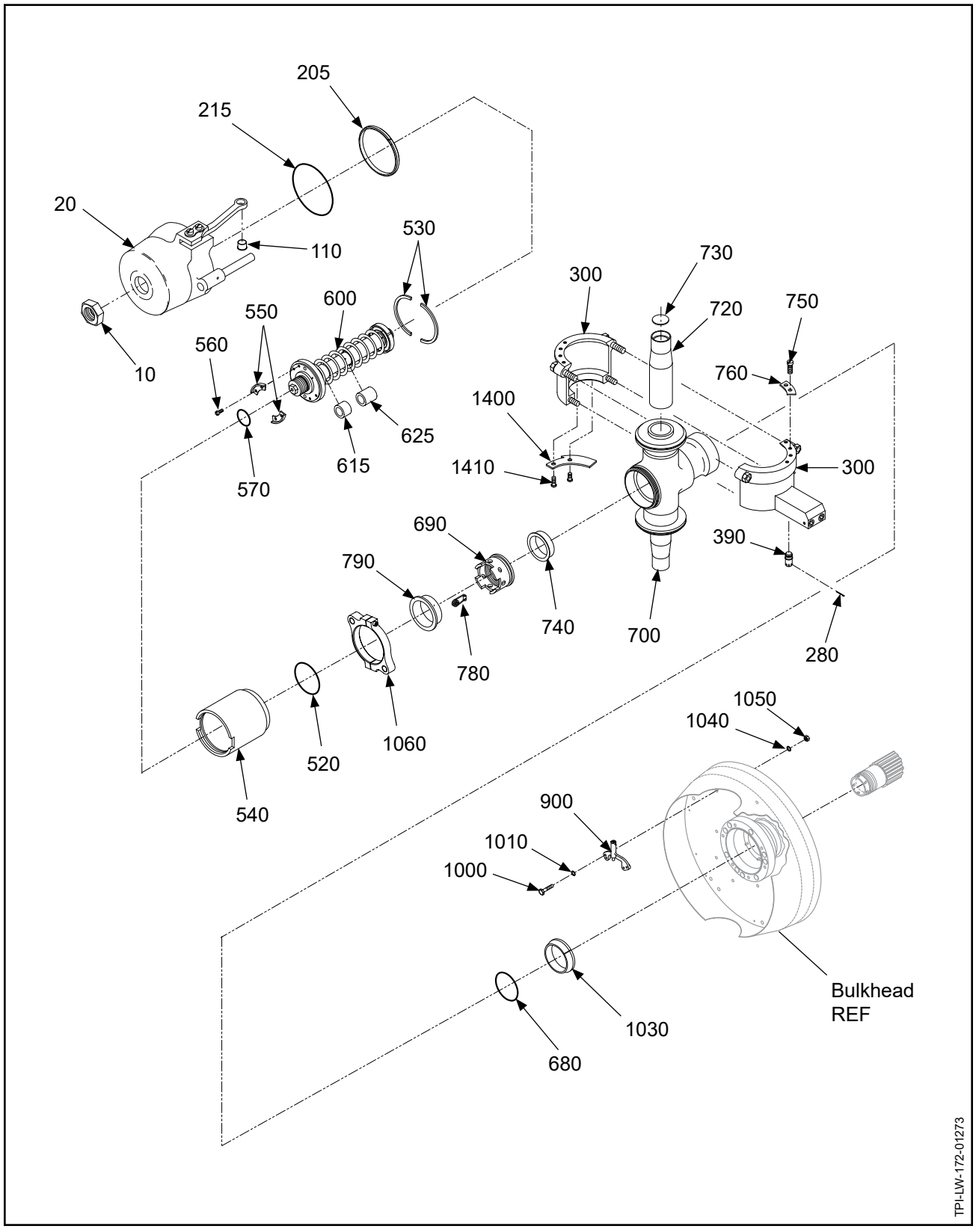

HC-A2MV20-2, 2A: Propeller Parts
Figure 10-8

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-8		**PROPELLER PARTS - HC-A2MV20-2, -2A**				
10	A-880-1	• NUT, HEX, SELF-LOCKING, THIN		1	Y	
20	832-26	• PISTON ASSEMBLY (REFER TO “832-26 PISTON ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
110	A-944	• SLEEVE, LINKSCREW		2	Y	
205	B-1843	• SEAL, DUST, PISTON		1	Y	
215	C-3317-343-1	• O-RING, PISTON		1	Y	
280	B-3838-3-3	• COTTER PIN, LINKSCREW		2	Y	
300	838-1006	• PCP: CLAMP ASSEMBLY “MV” SERIES - (REFER TO “838-1006: PCP: CLAMP ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		2		PCP
-385	A-6119	• BUSHING, LINK ARM - OPTIONAL		2	Y	
390	A-304	• LINKSCREW, 1/2-20		2	Y	
520	C-3317-235	• O-RING, CYLINDER		1	Y	
530	A-859	• KEEPER, SPLIT, FRONT		1		
540	B-854	• CYLINDER		1		
550	A-899-( )	• SPACER, STOP, PITCH		2		
560	B-3840-( )	• SCREW, 10-32, FILLISTER HEAD		4	Y	
570	C-3317-020	• O-RING, PITCH CHANGE ROD		1	Y	
600	831-84	• FEATHERING SPRING ASSEMBLY (REFER TO “838-84: FEATHERING SPRING ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
-615	B-6027	• SPACER, STOP, PITCH	-2A	1		
-625	B-6023-1	• SPACER	-2A	1		
680	C-3317-229	• O-RING, HUB MOUNTING		1	Y	
690	A-63B	• PCP: NUT, SHAFT, 20 SPLINE - USE WITH ITEM 790 SUPERSEDED BY ITEM 690A		1		PCP
690A	B-2063	• PCP: NUT, SHAFT, 20 SPLINE - USE WITH ITEM 790 SUPERSEDES ITEM 690		1		PCP
700	840-94	• PCP: HUB UNIT HC-A2_20-		1		PCP
720	A-1496	• •PILOT TUBE, REPLACED BY ITEM 720A		2		
720A	C-7080-( )	• •PILOT TUBE, REPLACES ITEM 720		2		
730	B-7070-17	• •PLUG, CUPPED, STEEL - USED WITH ITEM 720A		2	Y	
740	A-155	• • HUB BUSHING, SHAFT		1		
750	B-3840-( )	• SCREW, 10-32, FILLISTER HEAD		A/R	Y	
760	A-48	• BALANCE WEIGHT		A/R		
780	A-847	• SAFETY PIN, SHAFT NUT		1	Y	
790	A-870	• RING, PULLER, HUB - USE WITH ITEM 690		1		

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL
-2A	HC-A2MV20-2A		

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-8		**PROPELLER PARTS- HC-A2MV20-2, -2A - CONTINUED**				
900	830-2	• START LOCK ASSEMBLY (REFER TO “830-2: START LOCK ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
1000	B-3384-18	• BOLT, 1/4-28, HEX HEAD		4	Y	
1010	B-3851-0463	• WASHER		4	Y	
1030	A-50-3	• CONE, MOUNTING, REAR, 20 SPLINE		1		
1040	B-3851-0432	• WASHER		4	Y	
1050	B-3808-4	• NUT, HEX, SELF-LOCKING		4	Y	
1060	834-2A	• GUIDE COLLAR UNIT (REFER TO “834-2A: GUIDE COLLAR UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
1400	A-881	• PLATE, START LOCK		2		
1410	B-3840-5	• SCREW, 10-32, FILLISTER HEAD		4	Y	
		BLADE RETENTION PARTS (REFER TO “BLADE RETENTION PARTS” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)				
		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				

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

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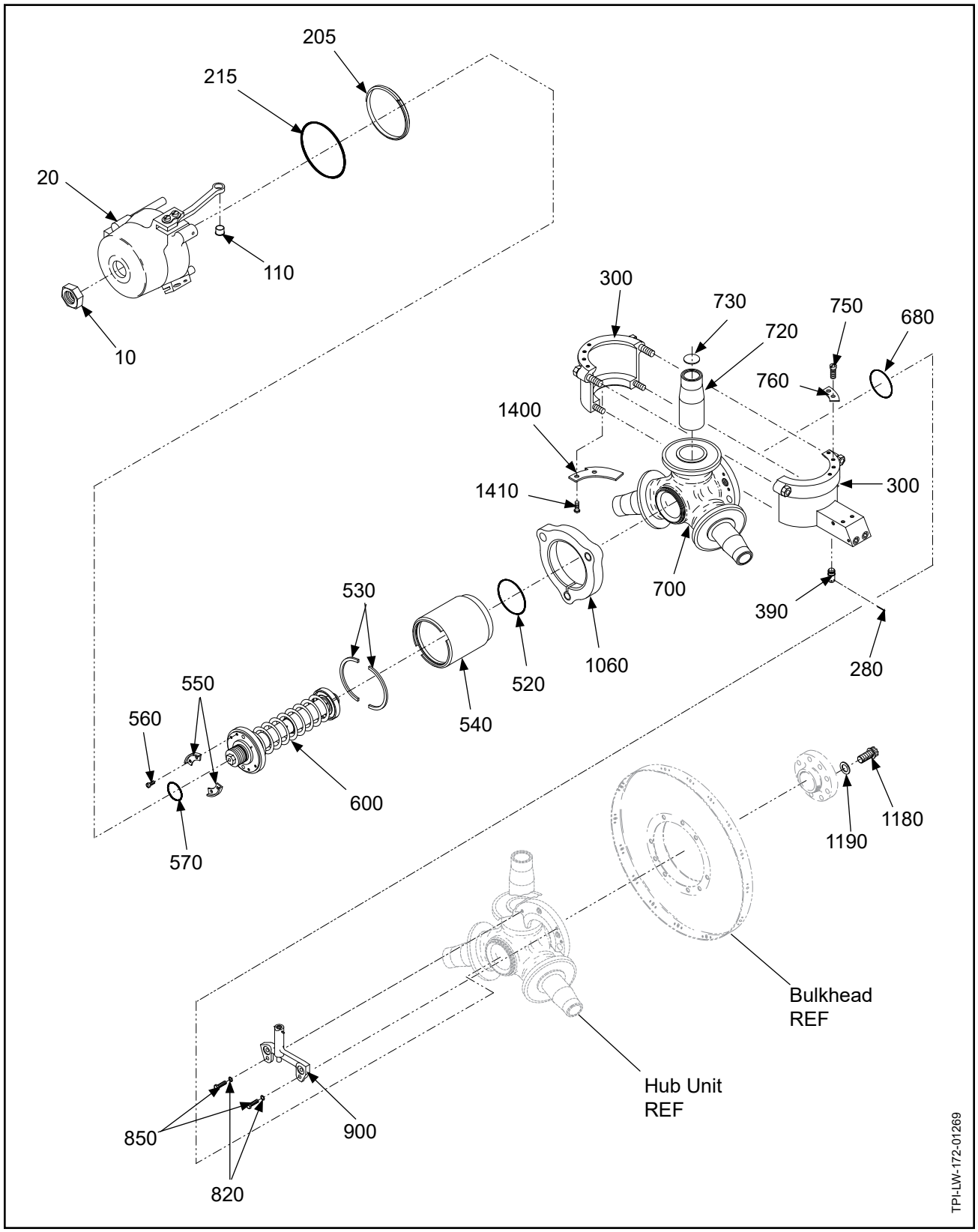

HC-A3VF-2, -2A, -2B, -2D: Propeller Parts
Figure 10-9

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-9		**PROPELLER PARTS - HC-A3VF-2, -2A, -2B, -2D**				
10	A-880-2	• NUT, HEX, SELF-LOCKING, THIN		1	Y	
20	832-17	• PISTON ASSEMBLY (REFER TO “832-17 PISTON ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
110	A-944	• SLEEVE, LINKSCREW - OPTIONAL		2	Y	
205	B-1843	• SEAL, DUST, PISTON		1	Y	
215	C-3317-343-1	• O-RING, PISTON		1	Y	
280	B-3838-3-3	• COTTER PIN		3	Y	
300	838-11A	• PCP: CLAMP ASSEMBLY, “V” SERIES - (REFER TO “838-11A: PCP: CLAMP ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	-2B	3		PCP
	838-23	• PCP: CLAMP ASSEMBLY, “V” SERIES - (REFER TO “838-23: PCP: CLAMP ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	-2D	3		PCP
	838-52	• PCP: CLAMP ASSEMBLY, “V” SERIES - (REFER TO “838-52: PCP: CLAMP ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	-2, -2A	3		PCP
-385	A-6119	• BUSHING, LINK ARM - OPTIONAL		2	Y	
390	A-304	• LINKSCREW, 1/2-20		3	Y	
520	C-3317-235	• O-RING, CYLINDER		1	Y	
530	A-859	• KEEPER, SPLIT, FRONT		1		
540	B-854	• CYLINDER		1		
550	A-899-( )	• SPACER, STOP, PITCH		2		
560	B-3840-6	• SCREW, 10-32, FILLISTER HEAD		4	Y	
570	C-3317-024	• O-RING, PITCH CHANGE ROD		1	Y	
600	831-4	• FEATHERING SPRING ASSEMBLY (REFER TO “838-4: FEATHERING SPRING ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
680	C-3317-228	• O-RING, HUB MOUNTING		1	Y	
700	840-82	• PCP: HUB UNIT, HC-A3_F-		1		PCP
720	A-1496	• •PILOT TUBE, REPLACED BY ITEM 720A		3		
720A	C-7080	• •PILOT TUBE, REPLACES ITEM 720		3		
730	B-7070-17	• •PLUG, STEEL, CUPPED - USED WITH ITEM 720A		3	Y	
750	B-3840-( )	• SCREW, 10-32, FILLISTER HEAD		A/R	Y	
760	A-48	• BALANCE WEIGHT		A/R	Y	
-770	B-6138-8-8	• DOWEL PIN		2	Y	
820	A-1864	• WASHER, 1/4 INCH, FIBER - OPTIONAL		A/R		
850	B-3384-4H	• BOLT, 1/4-28, HEX HEAD		6	Y	
-860	A-1864	• WASHER, 1/4 INCH, FIBER		6		

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL
-2	HC-A3VF-2	-2B	HC-A3VF-2B
-2A	HC-A3VF-2A	-2D	HC-A3VF-2D

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-9		**PROPELLER PARTS- HC-A3VF-2, -2A, -2B, -2D - CONTINUED**				
900	830-4	• START LOCK ASSEMBLY (REFER TO “830-4: START LOCK ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		3		
1060	834-1	• GUIDE COLLAR UNIT (REFER TO “834-1: GUIDE COLLAR UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
1180	A-1328-1	• BOLT, MOUNTING, 1/2-20, 12 POINT		6	Y	
1190	A-1381	• WASHER, 1/2”, CRES.		6	Y	
1400	A-881	• PLATE, START LOCK	-2, -2A, -2B	3		
1400A	A-881-2	• PLATE, START LOCK	-2D	3		
1410	A-2016	• BOLT, 10-32, HEX HEAD		6	Y	
		BLADE RETENTION PARTS (REFER TO “BLADE RETENTION PARTS” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)				
		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				

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL
-2	HC-A3VF-2	-2B	HC-A3VF-2B
-2A	HC-A3VF-2A	-2D	HC-A3VF-2D

- ITEM NOT ILLUSTRATED

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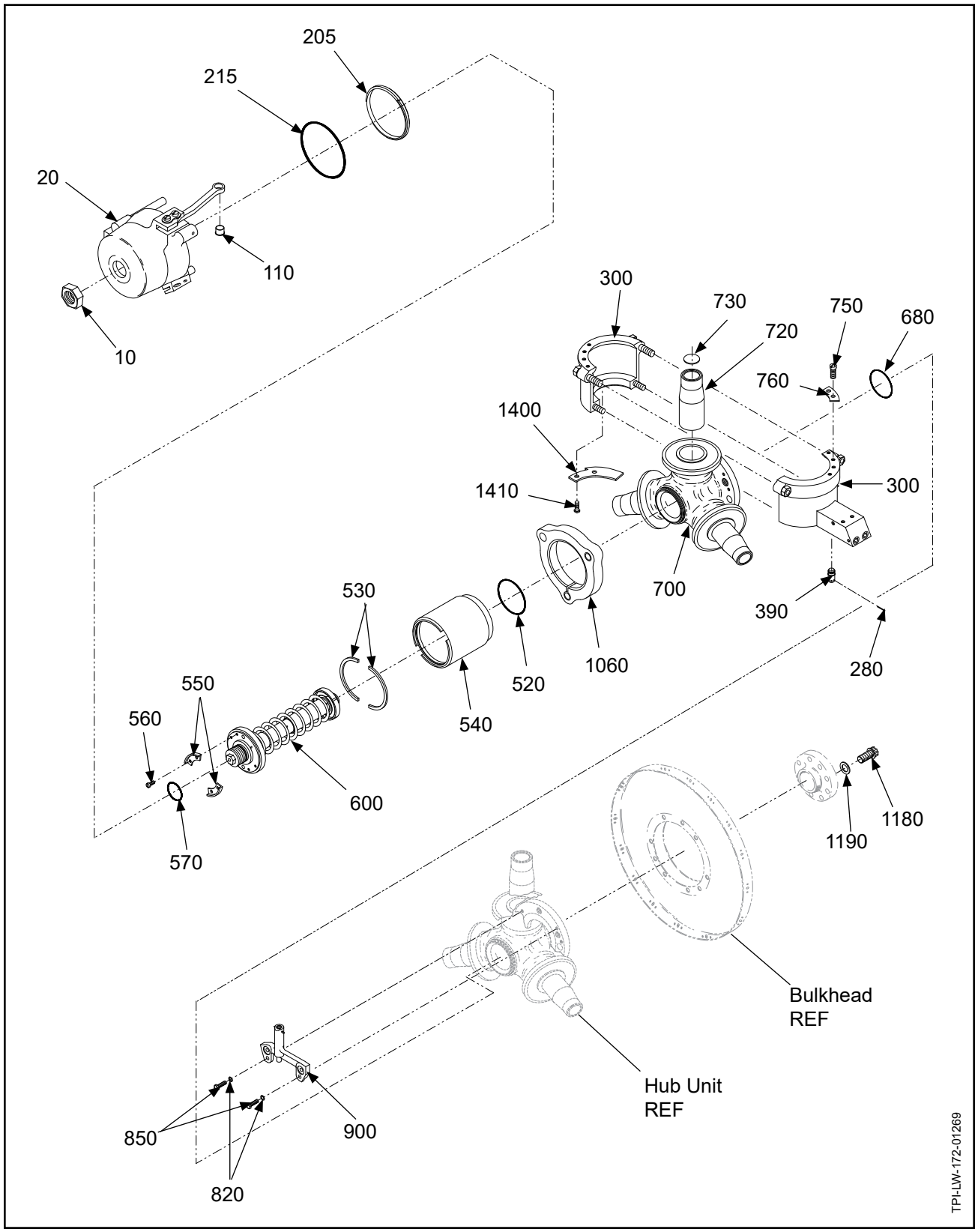

HC-A3MVF-2, -2A, -2B, -2D: Propeller Parts
Figure 10-10

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-10		**PROPELLER PARTS - HC-A3MVF-2, -2A, -2B, -2D**				
10	A-880-2	• NUT, HEX, SELF-LOCKING, THIN		1	Y	
20	832-17	• PISTON ASSEMBLY (REFER TO "832-17 PISTON ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
110	A-944	• SLEEVE, LINKSCREW - OPTIONAL		2	Y	
205	B-1843	• SEAL, DUST, PISTON		1	Y	
215	C-3317-343-1	• O-RING, PISTON		1	Y	
280	B-3838-3-3	• COTTER PIN		3	Y	
300	838-1011A	• PCP: CLAMP ASSEMBLY, "MV" SERIES - (REFER TO "838-1011A: PCP: CLAMP ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	-2B	3		PCP
	838-1023	• PCP: CLAMP ASSEMBLY, "MV" SERIES - (REFER TO "838-1023: PCP: CLAMP ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	-2D	3		PCP
	838-1052	• PCP: CLAMP ASSEMBLY, "MV" SERIES - (REFER TO "838-1052: PCP: CLAMP ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	-2, -2A	3		PCP
-385	A-6119	• BUSHING, LINK ARM - OPTIONAL		2	Y	
390	A-304	• LINKSCREW, 1/2-20		3	Y	
520	C-3317-235	• O-RING, CYLINDER		1	Y	
530	A-859	• KEEPER, SPLIT, FRONT		1		
540	B-854	• CYLINDER		1		
550	A-899-( )	• SPACER, STOP, PITCH		2		
560	B-3840-6	• SCREW, 10-32, FILLISTER HEAD		4	Y	
570	C-3317-020	• O-RING, PITCH CHANGE ROD		1	Y	
600	831-4	• FEATHERING SPRING ASSEMBLY (REFER TO "838-4: FEATHERING SPRING ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
680	C-3317-328	• O-RING, HUB MOUNTING		1	Y	
700	840-82	• PCP: HUB UNIT, HC-A3_F-		1		PCP
720	A-1496	• •PILOT TUBE, REPLACED BY ITEM 720A		3		
720A	C-7080	• •PILOT TUBE, REPLACES ITEM 720		3		
730	B-7070-17	• •PLUG, STEEL, CUPPED - USED WITH ITEM 720A		3	Y	
750	B-3840-( )	• SCREW, 10-32, FILLISTER HEAD		A/R	Y	
760	A-48	• BALANCE WEIGHT		A/R		
-770	B-6138-8-8	• DOWEL PIN		2	Y	
820	A-1864	• WASHER, 1/4 INCH, FIBER (OPTIONAL)		A/R		
850	B-3384-4H	• BOLT, 1/4-28, HEX HEAD		6	Y	
-860	A-1864	• WASHER, 1/4 INCH, FIBER		6		

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL
-2	HC-A3MVF-2	-2B	HC-A3MVF-2B
-2A	HC-A3MVF-2A	-2D	HC-A3MVF-2D

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-10		**PROPELLER PARTS - HC-A3MVF-2, -2A, -2B, -2D - CONTINUED**				
900	830-4	• START LOCK ASSEMBLY (REFER TO “830-4: START LOCK ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
1060	834-1	• GUIDE COLLAR UNIT (REFER TO “834-1: GUIDE COLLAR UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
1180	A-1328-1	• BOLT, MOUNTING, 1/2-20, 12 POINT		6	Y	
1190	A-1381	• WASHER, 1/2”, CRES.		6	Y	
1400	A-881	• PLATE, START LOCK	-2, -2A, -2B	3		
1400A	A-881-2	• PLATE, START LOCK	-2D	3		
1410	A-2016	• BOLT, 10-32, HEX HEAD		6	Y	
		BLADE RETENTION PARTS (REFER TO “BLADE RETENTION PARTS” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)				
		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				

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL
-2	HC-A3MVF-2	-2B	HC-A3MVF-2B
-2A	HC-A3MVF-2A	-2D	HC-A3MVF-2D

- ITEM NOT ILLUSTRATED

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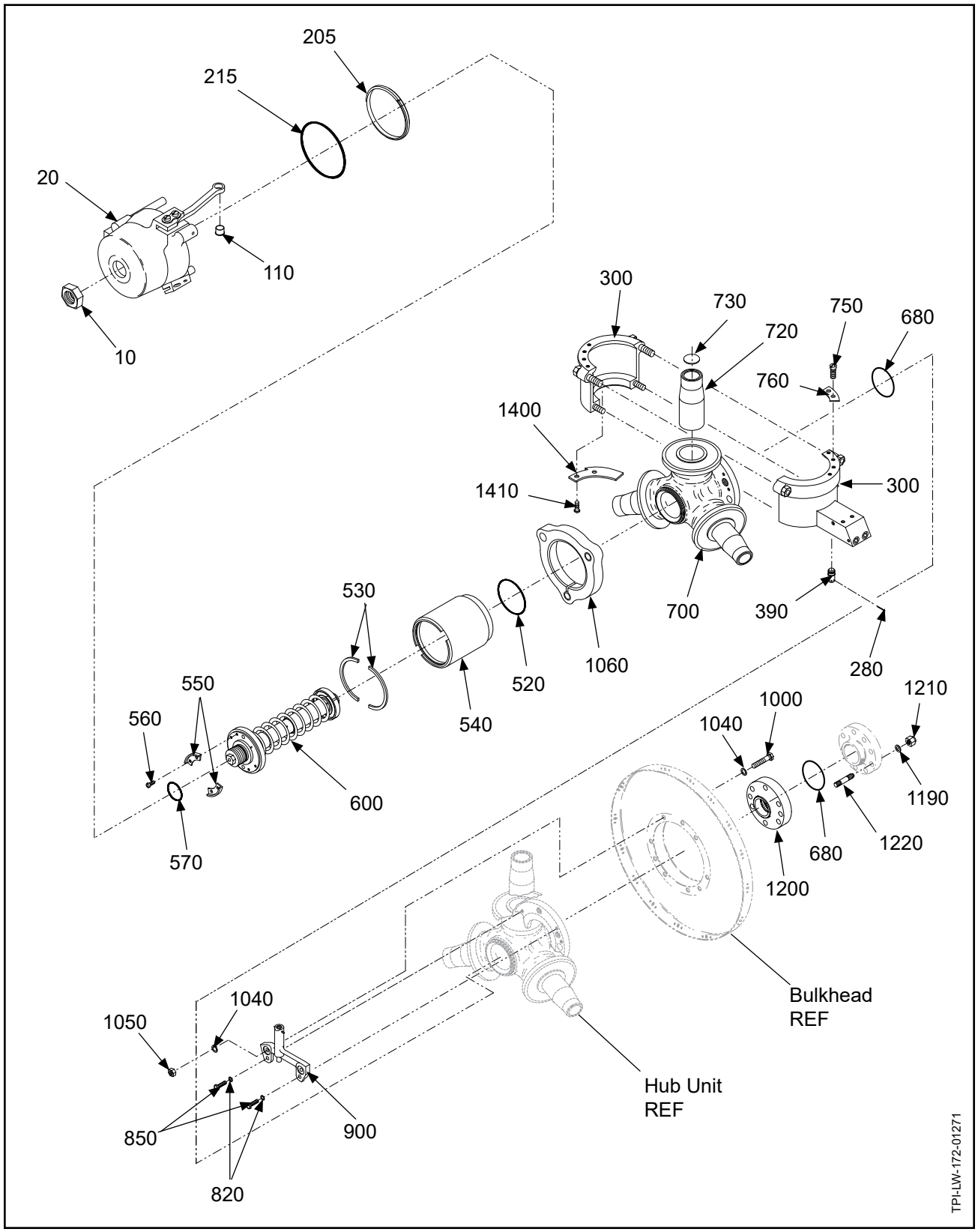

EHC-A3VF-2B: Propeller Parts
Figure 10-11

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-11		**PROPELLER PARTS - EHC-A3VF-2B**				
10	A-880-2	• NUT, HEX, SELF-LOCKING, THIN		1	Y	
20	832-17	• PISTON ASSEMBLY (REFER TO "832-17 PISTON ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
110	A-944	• SLEEVE, LINKSCREW - OPTIONAL		2	Y	
205	B-1843	• SEAL, DUST, PISTON		1	Y	
215	C-3317-343-1	• O-RING, PISTON		1	Y	
280	B-3838-3-3	• COTTER PIN		3	Y	
300	838-11A	• PCP: CLAMP ASSEMBLY, "V" SERIES - (REFER TO "838-11A: PCP: CLAMP ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		3		PCP
-385	A-6119	• BUSHING, LINK ARM - OPTIONAL		3	Y	
390	A-304	• LINKSCREW, 1/2-20		3	Y	
520	C-3317-235	• O-RING, CYLINDER		1	Y	
530	A-859	• KEEPER, SPLIT, FRONT		1		
540	B-854	• CYLINDER		1		
550	A-899-( )	• SPACER, STOP, PITCH		2		
560	B-3840-6	• SCREW, 10-32, FILLISTER HEAD		4	Y	
570	C-3317-024	• O-RING, PITCH CHANGE ROD		1	Y	
600	831-4	• FEATHERING SPRING ASSEMBLY (REFER TO "838-4: FEATHERING SPRING ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
680	C-3317-228	• O-RING, HUB MOUNTING		2	Y	
700	840-82	• PCP: HUB UNIT, HC-A3_F-		1		PCP
720	A-1496	• •PILOT TUBE, REPLACED BY ITEM 720A		3		
720A	C-7080	• •PILOT TUBE, REPLACES ITEM 720		3		
730	B-7070-17	• •PLUG, CUPPED, STEEL - USED WITH ITEM 720A		3	Y	
750	B-3840-( )	• SCREW, 10-32, FILLISTER HEAD		A/R	Y	
760	A-48	• BALANCE WEIGHT		A/R		
-770	B-6138-8-8	• DOWEL PIN		4	Y	
820	A-1864	• WASHER, 1/4 INCH, FIBER - OPTIONAL		A/R		
850	B-3384-4H	• BOLT, 1/4-28, HEX HEAD		6	Y	
-860	A-1864	• WASHER, 1/4 INCH, FIBER - OPTIONAL		6		
900	830-4	• START LOCK ASSEMBLY (REFER TO "830-4: START LOCK ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-11		**PROPELLER PARTS - EHC-A3VF-2B - CONTINUED**				
1000	B-3384-23	• BOLT, 1/4-28, HEX HEAD		6	Y	
-1010	A-1864	• WASHER, 1/4 INCH, FIBER		6	Y	
1040	B-3851-0432	• WASHER		6	Y	
1050	B-3808-4	• NUT, HEX, SELF-LOCKING		6	Y	
1060	834-1	• GUIDE COLLAR UNIT (REFER TO “834-1: GUIDE COLLAR UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
1190	A-1381	• WASHER, 1/2”, CRES.		6	Y	
1200	B-2982	• SPACER, “F” FLANGE		1		
1210	A-2044	• NUT, SELF LOCKING		6	Y	
1220	A-2983	• STUD, MOUNTING		6	Y	
1400	A-881	• PLATE, START LOCK		3		
1410	A-2016	• BOLT, 10-32, HEX HEAD		6	Y	
-1410A	A-2016-A	• BOLT, HEX HEAD - OPTIONAL		6	Y	
-1420	A-B3851-0363	• WASHER - OPTIONAL, USE WITH 1410A		6	Y	
		BLADE RETENTION PARTS (REFER TO “BLADE RETENTION PARTS” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)				
		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				

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

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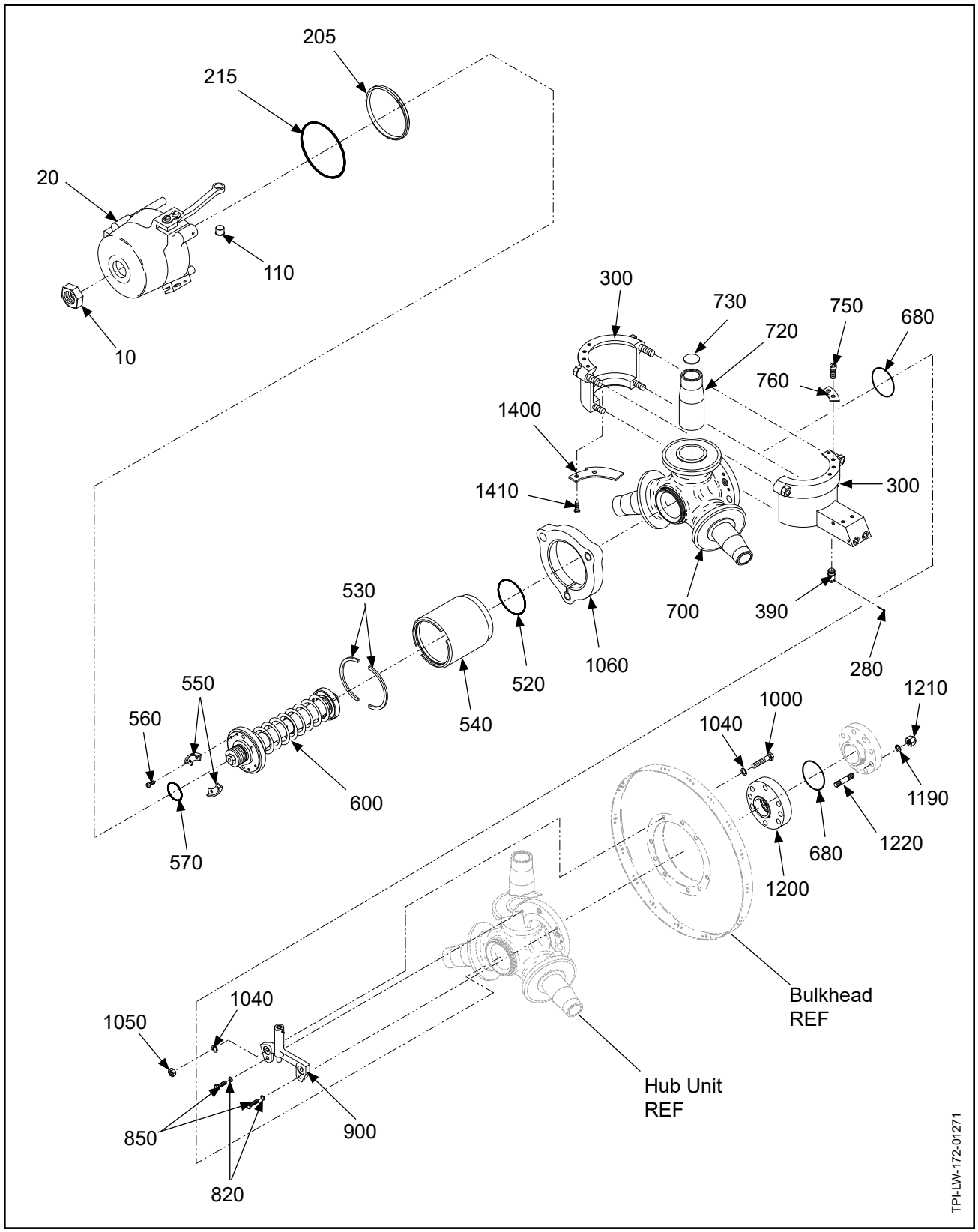

EHC-A3MVF-2B: Propeller Parts
Figure 10-12

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-12		**PROPELLER PARTS - EHC-A3MVF-2B**				
10	A-880-2	• NUT, HEX, SELF-LOCKING, THIN		1	Y	
20	832-17	• PISTON ASSEMBLY (REFER TO "832-17 PISTON ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
110	A-944	• SLEEVE, LINKSCREW		2	Y	
205	B-1843	• SEAL, DUST, PISTON		1	Y	
215	C-3317-343-1	• O-RING, PISTON		1	Y	
280	B-3838-3-3	• COTTER PIN		3	Y	
300	838-1011A	• PCP: CLAMP ASSEMBLY, "MV" SERIES - (REFER TO "838-1011A: PCP: CLAMP ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		3		PCP
-385	A-6119	• BUSHING, LINK ARM - OPTIONAL		2	Y	
390	A-304	• LINKSCREW, 1/2-20		3	Y	
520	C-3317-235	• O-RING, CYLINDER		1	Y	
530	A-859	• KEEPER, SPLIT, FRONT		1		
540	B-854	• CYLINDER		1		
550	A-899-( )	• SPACER, STOP, PITCH		2		
560	B-3840-6	• SCREW, 10-32, FILLISTER HEAD		4	Y	
570	C-3317-024	• O-RING, PITCH CHANGE ROD		1	Y	
600	831-4	• FEATHERING SPRING ASSEMBLY (REFER TO "838-4: FEATHERING SPRING ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
680	C-3317-228	• O-RING, HUB MOUNTING		2	Y	
700	840-102	• PCP: HUB UNIT, EHC-A3_F-		1		PCP
720	A-1496	• •PILOT TUBE, REPLACED BY ITEM 720A		3		
720A	C-7080	• •PILOT TUBE, REPLACES ITEM 720		3		
730	B-7070-17	• •PLUG, CUPPED, STEEL - USED WITH ITEM 720A		3	Y	
750	B-3840-( )	• SCREW, 10-32, FILLISTER HEAD		A/R	Y	
760	A-48	• BALANCE WEIGHT		A/R		
-770	B-6138-8-8	• DOWEL PIN		4	Y	
820	A-1864	• WASHER, 1/4 INCH, FIBER - OPTIONAL		A/R		
850	B-3384-4H	• BOLT, 1/4-28, HEX HEAD		6	Y	
-860	A-1864	• WASHER, 1/4 INCH, FIBER - OPTIONAL		6		
900	830-4	• START LOCK ASSEMBLY (REFER TO "830-4: START LOCK ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		3		

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-12		**PROPELLER PARTS -EHC-A3MVF-2B - CONTINUED**				
1000	B-3384-23	• BOLT, 1/4-28, HEX HEAD		6	Y	
-1010	A-1864	• WASHER, 1/4 INCH, FIBER		6	Y	
1040	B-3851-0432	• WASHER		6	Y	
1050	B-3808-4	• NUT, HEX, SELF-LOCKING		6	Y	
1060	834-1	• GUIDE COLLAR UNIT (REFER TO “834-1: GUIDE COLLAR UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
1190	A-1381	• WASHER, 1/2”, CRES.		6	Y	
1200	B-2982	• SPACER, “F” FLANGE		1		
1210	A-2044	• NUT, SELF LOCKING		6	Y	
1220	A-2983	• STUD, MOUNTING		6	Y	
1400	A-881	• PLATE, START LOCK		3		
1410	A-2016	• BOLT, 10-32, HEX HEAD		6	Y	
-1410A	A-2016-A	• BOLT, 10-32, HEX HEAD - OPTIONAL		6	Y	
-1420	B-3851-0363	• WASHER - OPTIONAL, USE WITH 1410A		6	Y	
		BLADE RETENTION PARTS (REFER TO “BLADE RETENTION PARTS” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)				
		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				

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

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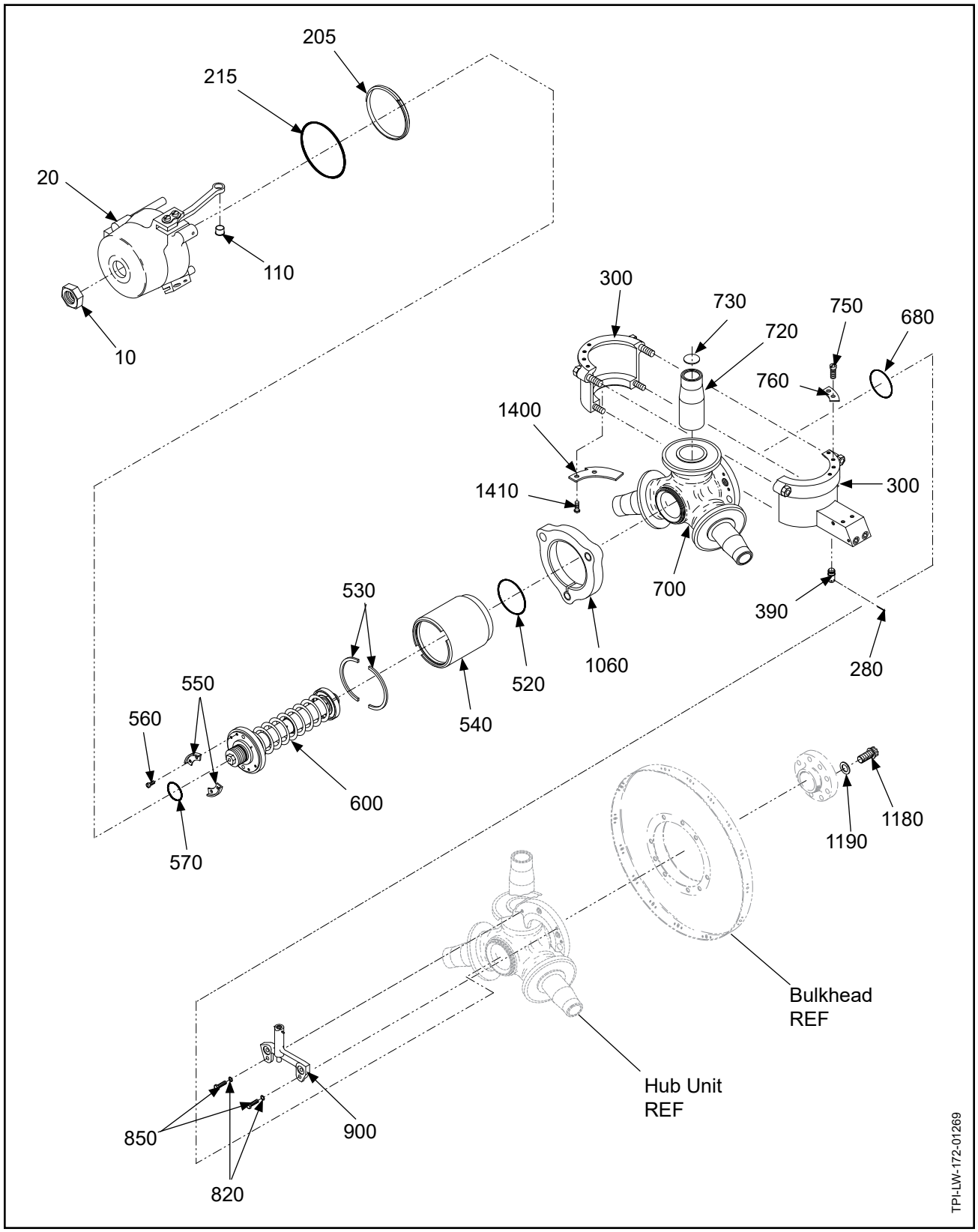

PHC-A3VF-2B, -2C, -2D: Propeller Parts
Figure 10-13

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-13		**PROPELLER PARTS - PHC-A3VF-2B, -2C, -2D**				
10	A-880-2	• NUT, HEX, SELF-LOCKING, THIN		1	Y	
20	832-17	• PISTON ASSEMBLY (REFER TO “832-17 PISTON ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
110	A-944	• SLEEVE, LINKSCREW		2	Y	
205	B-1843	• SEAL, DUST, PISTON		1	Y	
215	C-3317-343-1	• O-RING, PISTON		1	Y	
280	B-3838-3-3	• COTTER PIN		3	Y	
300	838-11A	• CLAMP ASSEMBLY (REFER TO “838-11A: PCP: CLAMP ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	-2B	3		
	838-23	• CLAMP ASSEMBLY (REFER TO “838-23: PCP: CLAMP ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	-2D	3		
300A	838-6	• CLAMP ASSEMBLY (REFER TO “838-6: PCP: CLAMP ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	-2C	3		
-385	A-6119	• BUSHING, LINK ARM - OPTIONAL		3	Y	
390	A-304	• LINKSCREW, 1/2-20		3	Y	
520	C-3317-235	• O-RING, CYLINDER		1	Y	
530	A-859	• KEEPER, SPLIT, FRONT		1		
540	B-854	• CYLINDER		1		
550	A-899-( )	• SPACER, STOP, PITCH		2		
560	B-3840-6	• SCREW, 10-32, FILLISTER HEAD		4	Y	
570	C-3317-024	• O-RING, PITCH CHANGE ROD		1	Y	
600	831-4	• FEATHERING SPRING ASSEMBLY (REFER TO “838-4: FEATHERING SPRING ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
680	C-3317-328	• O-RING, HUB MOUNTING		1	Y	
700	840-83	• PCP: HUB UNIT, PHC-A3_F		1		PCP
720	A-1496	• • PILOT TUBE, REPLACED BY ITEM 720A		3		
720A	C-7080	• • PILOT TUBE, REPLACES ITEM 720		3		
730	B-7070-17	• • PLUG, CUPPED, STEEL - USED WITH ITEM 720A		3	Y	
750	B-3840-( )	• SCREW, 10-32, FILLISTER HEAD		A/R	Y	
760	A-48	• BALANCE WEIGHT		A/R		
-770	B-6138-8-8	• DOWEL PIN		2	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL
-2B	PHC-A3VF-2B		
-2C	PHC-A3VF-2C		
-2D	PHC-A3VF-2D		

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-13		**PROPELLER PARTS - PHC-A3VF-2B, -2C, -2D - CONTINUED**				
820	A-1864	• WASHER, 1/4 INCH, FIBER - OPTIONAL		A/R		
850	B-3384-4H	• BOLT, 1/4-28, HEX HEAD		6	Y	
-860	A-1864	• WASHER, 1/4 INCH, FIBER		6	Y	
900	830-4	• START LOCK ASSEMBLY (REFER TO “830-4: START LOCK ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
1060	834-1	• GUIDE COLLAR UNIT (REFER TO “834-1: GUIDE COLLAR UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
1180	A-1328-1	• BOLT, MOUNTING, 1/2-20, 12 POINT		6	Y	
1190	A-1381	• WASHER, 1/2”, CRES.		6	Y	
1400	A-881	• PLATE, START LOCK	-2B,-2C	3		
	A-881-2	• PLATE, START LOCK	-2D	3		
1410	A-2016	• BOLT, 10-32, HEX HEAD		6	Y	
		BLADE RETENTION PARTS (REFER TO “BLADE RETENTION PARTS” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)				
		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				

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL
-2B	PHC-A3VF-2B		
-2C	PHC-A3VF-2C		
-2D	PHC-A3VF-2D		

- ITEM NOT ILLUSTRATED

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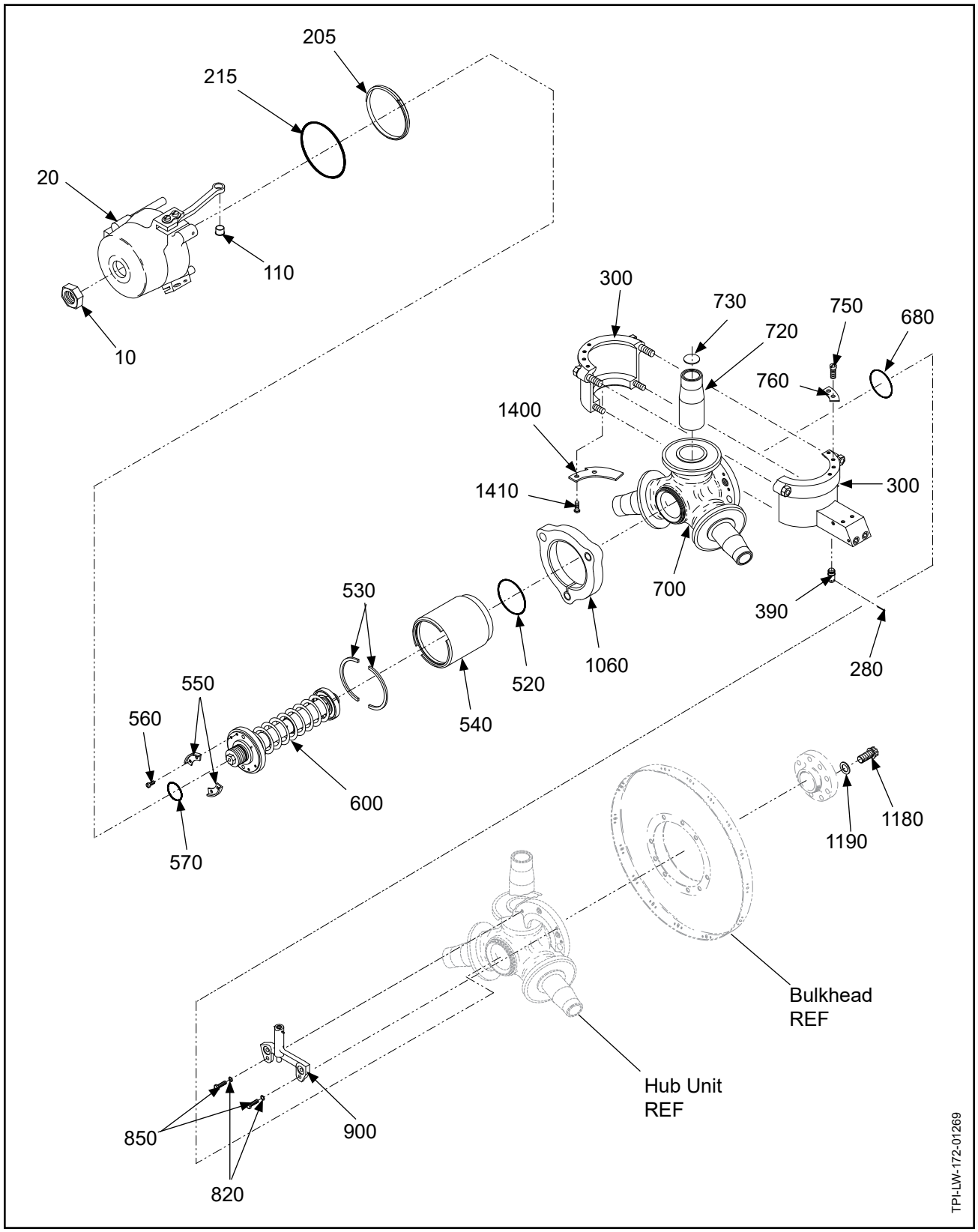

PHC-A3MVF-2B, -2C, -2D: Propeller Parts
Figure 10-14

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-14		**PROPELLER PARTS - PHC-A3MVF-2B, -2C, -2D**				
10	A-880-2	• NUT, HEX, SELF-LOCKING, THIN		1	Y	
20	832-17	• PISTON ASSEMBLY (REFER TO “832-17 PISTON ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
110	A-944	• SLEEVE, LINKSCREW		2	Y	
205	B-1843	• SEAL, DUST, PISTON		1	Y	
215	C-3317-343-1	• O-RING, PISTON		1	Y	
280	B-3838-3-3	• COTTER PIN		3	Y	
300	838-1006	• PCP: CLAMP ASSEMBLY (REFER TO “838-1006: PCP: CLAMP ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	-2C	3		PCP
	838-1011A	• PCP: CLAMP ASSEMBLY (REFER TO “838-1011A: PCP: CLAMP ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	-2B	3		PCP
	838-1023	• PCP: CLAMP ASSEMBLY (REFER TO “838-1023: PCP: CLAMP ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	-2D	3		PCP
-385	A-6119	• BUSHING, LINK ARM - OPTIONAL		3	Y	
390	A-304	• LINKSCREW, 1/2-20		3	Y	
520	C-3317-235	• O-RING, CYLINDER		1	Y	
530	A-859	• KEEPER, SPLIT, FRONT		1		
540	B-854	• CYLINDER		1		
550	A-899-( )	• SPACER, STOP, PITCH		2		
560	B-3840-6	• SCREW, 10-32, FILLISTER HEAD		4	Y	
570	C-3317-024	• O-RING, PITCH CHANGE ROD		1	Y	
600	831-4	• FEATHERING SPRING ASSEMBLY (REFER TO “838-4: FEATHERING SPRING ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
680	C-3317-228	• O-RING, HUB MOUNTING		1	Y	
700	840-83	• PCP: HUB UNIT, PHC-A3_F		1		PCP
720	A-1496	• •PILOT TUBE, REPLACED BY ITEM 720A		3		
720A	C-7080	• •PILOT TUBE, REPLACES ITEM 720		3		
730	B-7070-17	• •PLUG, CUPPED, STEEL - USED WITH 720A		3	Y	
750	B-3840-( )	• SCREW, 10-32, FILLISTER HEAD		A/R	Y	
760	A-48	• BALANCE WEIGHT		A/R		
-770	B-6138-8-8	• DOWEL PIN		2	Y	
820	A-1864	• WASHER, 1/4 INCH, FIBER - OPTIONAL		A/R		
850	B-3384-4H	• BOLT, 1/4-28, HEX HEAD		6	Y	
-860	A-1864	• WASHER, 1/4 INCH, FIBER		6		

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL
-2B	PHC-A3MVF-2B		
-2C	PHC-A3MVF-2C		
-2D	PHC-A3MVF-2D		

- ITEM NOT ILLUSTRATED

PHC-A3MVF-2B, -2C, -2D

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-14		**PROPELLER PARTS - PHC-A3MVF-2B, -2C, -2D - CONTINUED**				
900	830-4	• START LOCK ASSEMBLY (REFER TO “830-4: START LOCK ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		3		
1060	834-1	• GUIDE COLLAR UNIT (REFER TO “834-1: GUIDE COLLAR UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
1180	A-1328-1	• BOLT, MOUNTING, 1/2-20, 12 POINT		6	Y	
1190	A-1381	• WASHER, 1/2”, CRES.		6	Y	
1400	A-881	• PLATE, START LOCK	-2B,-2D	3		
1400A	A-881-2	• PLATE, START LOCK	-2C	3		
1410	A-2016	• BOLT, 10-32, HEX HEAD		6	Y	
		BLADE RETENTION PARTS (REFER TO “BLADE RETENTION PARTS” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)				
		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				

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL
-2B	PHC-A3MVF-2B		
-2C	PHC-A3MVF-2C		
-2D	PHC-A3MVF-2D		

- ITEM NOT ILLUSTRATED

PHC-A3MVF-2B, -2C, -2D

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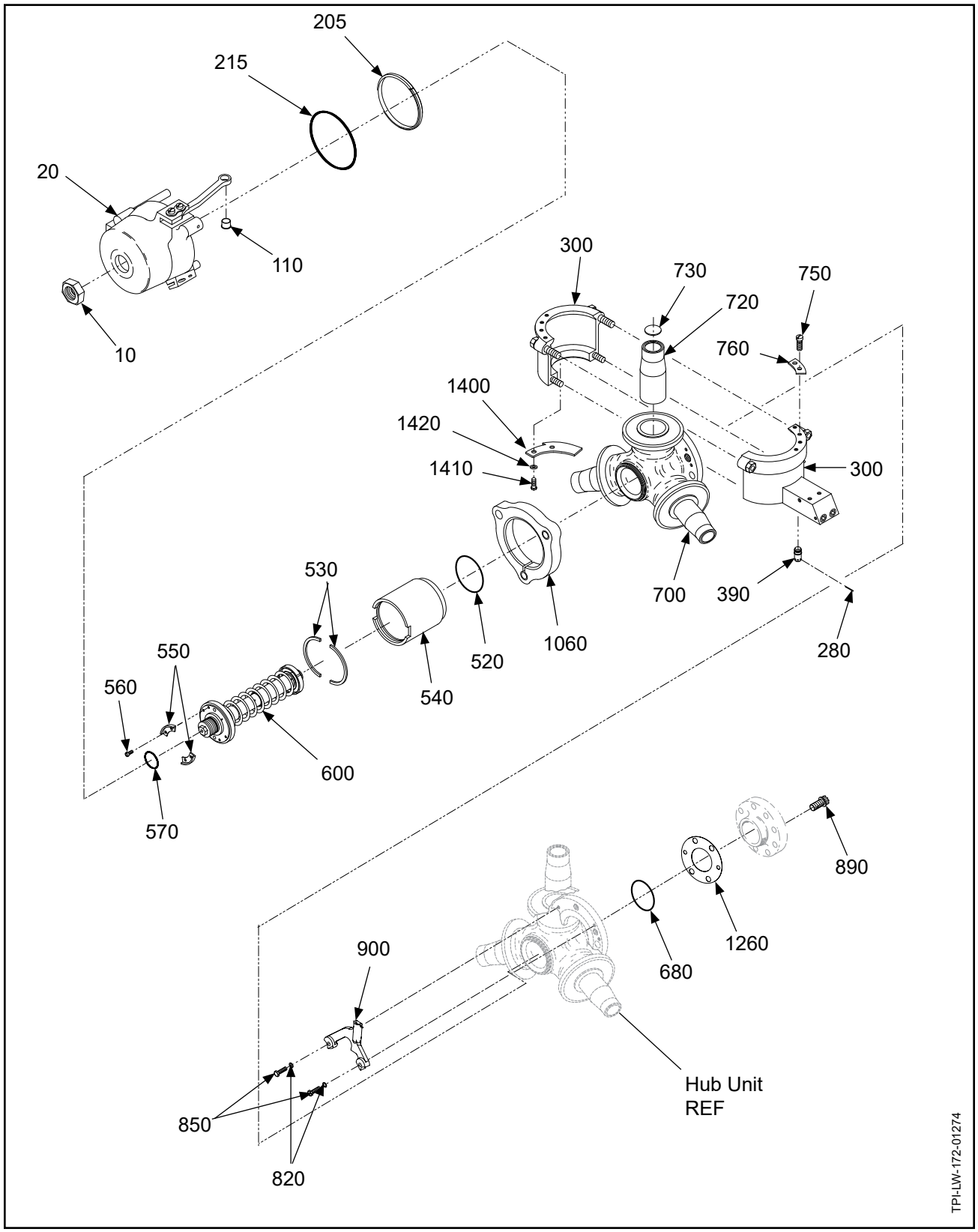


HC-A3VK-2, -2A, -2B, -2BL, -2C: Propeller Parts
Figure 10-15

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-15		**PROPELLER PARTS - HC-A3VK-2, -2A, -2B, -2BL, -2C**				
10	A-880-2	• NUT, HEX, SELF-LOCKING, THIN		1	Y	
20	832-17	• PISTON ASSEMBLY (REFER TO “832-17 PISTON ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	-2, -2A, -2B,-2C	1 1		
	832-17L	• PISTON ASSEMBLY (REFER TO “832-17L PISTON ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	-2BL	1 1		
110	A-944	• SLEEVE, LINKSCREW - OPTIONAL		3	Y	
205	B-1843	• SEAL, DUST, PISTON		1	Y	
215	C-3317-343-1	• O-RING, PISTON		1	Y	
280	B-3838-3-3	• COTTER PIN		3	Y	
300	838-6	• CLAMP ASSEMBLY (REFER TO “838-6: PCP: CLAMP ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	-2, -2C	3		
	838-60	• PCP: CLAMP ASSEMBLY “V” SERIES (REFER TO “838-60: PCP: CLAMP ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	-2A	3		PCP
	838-11A	• PCP: CLAMP ASSEMBLY (REFER TO “838-11A: PCP: CLAMP ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	-2B	3		PCP
	838-11AL	• PCP: CLAMP ASSEMBLY (REFER TO “838-11AL: PCP: CLAMP ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	-2BL	3		PCP
-385	A-6119	• BUSHING, LINK ARM - OPTIONAL		3	Y	
390	A-304	• LINKSCREW, 1/2-20		3	Y	
520	C-3317-235	• O-RING, CYLINDER		1	Y	
530	A-859	• KEEPER, SPLIT, FRONT		1		
540	B-854	• CYLINDER		1		
550	A-899-( )	• SPACER, STOP, PITCH		2		
560	B-3840-6	• SCREW, 10-32, FILLISTER HEAD		4	Y	
570	C-3317-024	• O-RING, PITCH CHANGE		1	Y	
600	831-4	• FEATHERING SPRING ASSEMBLY (REFER TO “838-4: FEATHERING SPRING ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
680	C-3317-329	• O-RING, HUB MOUNTING		1	Y	
700	840-77	• PCP: HUB UNIT, HC-A3_K-		1		PCP
720	A-1496	• •PILOT TUBE, REPLACED BY ITEM 720A		3		
720A	C-7080	• •PILOT TUBE, REPLACES ITEM 720		3		
730	B-7070-17	• •PLUG, CUPPED, STEEL - USED WITH ITEM 720A		3	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL
-2	HC-A3VK-2	-2B	HC-A3VK-2B
-2A	HC-A3VK-2A	-2BL	HC-A3VK-2BL
		-2C	HC-A3VK-2C

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-15		**PROPELLER PARTS - HC-A3VK-2, -2A, -2B, -2BL, -2C - CONTINUED**				
750	B-3840-5	• SCREW, 10-32, FILLISTER HEAD		A/R	Y	
760	A-48	• BALANCE WEIGHT		A/R	Y	
820	A-1864	• WASHER, 1/4 INCH, FIBER - OPTIONAL		A/R		
850	B-3384-4H	• BOLT, 1/4-28, HEX HEAD		6	Y	
890	A-1333-3	• BOLT, MOUNTING,1/2-20, HEX HEAD		3	Y	
890A	A-1328	• BOLT, MOUNTING, 1/2-20, 12 POINT		3	Y	
900	830-9B	• START LOCK ASSEMBLY (REFER TO “830-9B: START LOCK ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	-2, -2A, -2B, -2C	3		
	830-9L	• START LOCK ASSEMBLY (REFER TO “830-9L: START LOCK ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	-2BL	3		
1060	834-1	• GUIDE COLLAR UNIT (REFER TO “834-1: GUIDE COLLAR UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	-2, -2A, -2B, -2C	1		
	834-1L	• GUIDE COLLAR UNIT (REFER TO “834-1L: GUIDE COLLAR UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	-2BL	1		
1260	B-1322	• SHIM, MOUNTING, “K” FLANGE		1	Y	
1400	A-881	• PLATE, START LOCK		3		
1410	B-3873-H5A	• BOLT, HEX HEAD		6	Y	
1420	B-3851-0363	• WASHER - USED WITH 1410		18	Y	

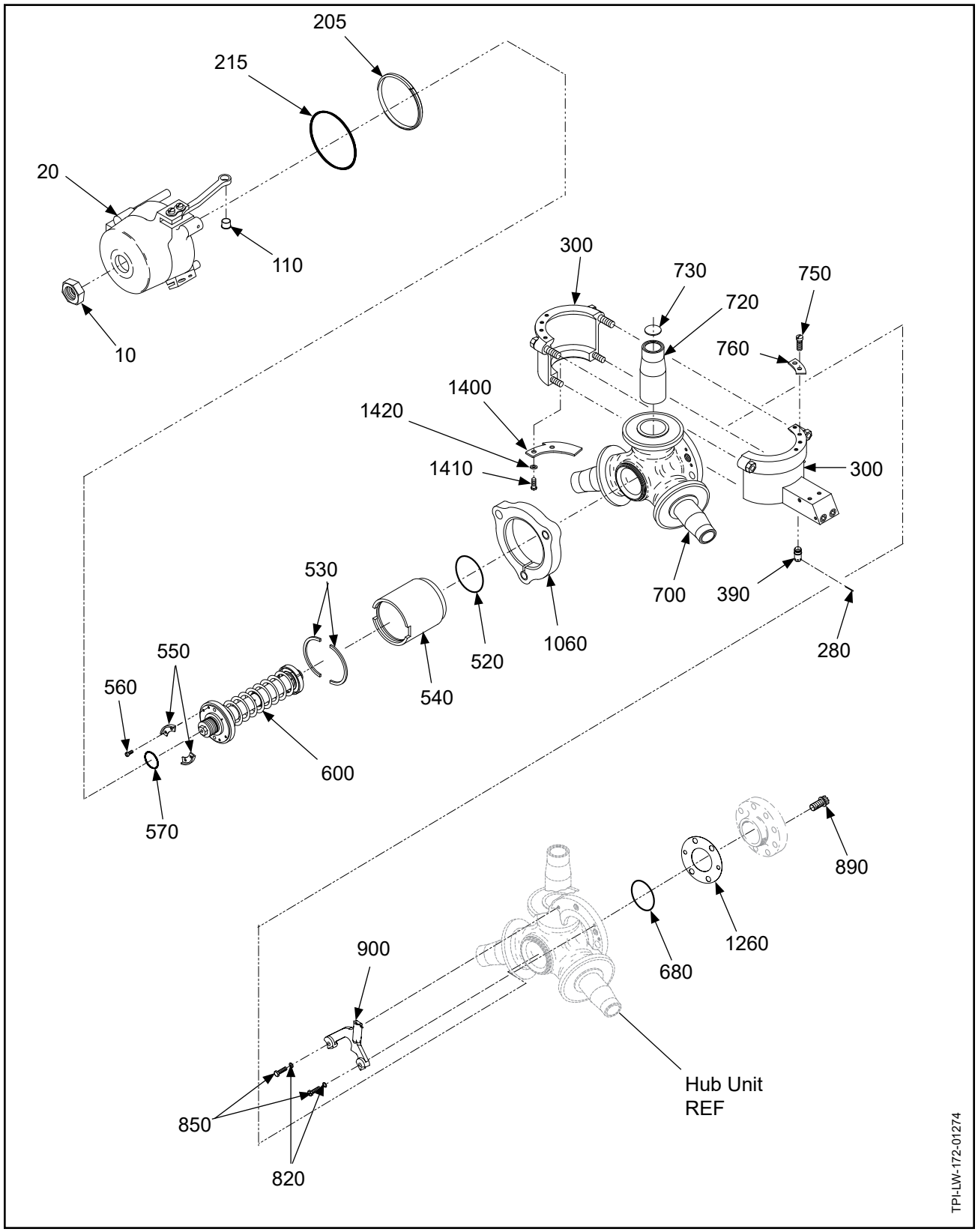
EFFECTIVITY	MODEL	EFFECTIVITY	MODEL
-2	HC-A3VK-2	-2B	HC-A3VK-2B
-2A	HC-A3VK-2A	-2BL	HC-A3VK-2BL
		-2C	HC-A3VK-2C

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-15		**PROPELLER PARTS - HC-A3VK-2, -2A, -2B, -2BL, -2C - CONTINUED**				
		BLADE RETENTION PARTS				
		(REFER TO “BLADE RETENTION PARTS” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)				
		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				

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED



HC-A3MVK-2, -2A, -2B, -2BL, -2C: Propeller Parts
Figure 10-16

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-16		**PROPELLER PARTS - HC-A3MVK-2, -2A, -2B, -2BL, -2C**				
10	A-880-2	• NUT, HEX, SELF-LOCKING, THIN		1	Y	
20	832-17	• PISTON ASSEMBLY (REFER TO "832-17 PISTON ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	-2, -2A, -2B,-2C	1		
20A	832-17L	• PISTON ASSEMBLY (REFER TO "832-17L PISTON ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	-2BL	1 1		
205	B-1843	• SEAL, DUST, PISTON		1	Y	
215	C-3317-343-1	• O-RING, PISTON		1	Y	
280	B-3838-3-3	• COTTER PIN		3	Y	
300	838-1006	• PCP: CLAMP ASSEMBLY "MV" SERIES REPLACED BY ITEM 300A (REFER TO "838-106: PCP: CLAMP ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	-2, -2C	3		PCP
	838-1011A	• PCP: CLAMP ASSEMBLY "MV" SERIES (REFER TO "838-1060: PCP: CLAMP ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	-2B	3		PCP
	838-1011L	• PCP: CLAMP ASSEMBLY "MV" SERIES (REFER TO "838-1011L: PCP: CLAMP ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	-2BL	3		PCP
	838-1060	• PCP: CLAMP ASSEMBLY "MV" SERIES (REFER TO "838-1060: PCP: CLAMP ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	-2A	3		PCP
300A	838-1106	• PCP: CLAMP ASSEMBLY "MV" SERIES REPLACES ITEM 300 (REFER TO "838-1106: PCP: CLAMP ASSEMBLY"	-2, -2C	3		PCP
-385	A-6119	• BUSHING, LINK ARM		3	Y	
390	A-304	• LINKSCREW, 1/2-20		3	Y	
520	C-3317-235	• O-RING, CYLINDER		1	Y	
530	A-859	• KEEPER, SPLIT, FRONT		1		
540	B-854	• CYLINDER		1		
550	A-899-( )	• SPACER, STOP, PITCH		2		
560	B-3840-6	• SCREW, 10-32, FILLISTER HEAD		4	Y	
570	C-3317-024	• O-RING, PITCH CHANGE ROD		1	Y	
600	831-4	• FEATHERING SPRING ASSEMBLY (REFER TO "838-4: FEATHERING SPRING ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
680	C-3317-329	• O-RING, HUB MOUNTING		2	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL
-2	HC-A3MVK-2	-2B	HC-A3MVK-2B
-2A	HC-A3MVK-2A	-2BL	HC-A3MVK-2BL
		-2C	HC-A3MVK-2C

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-16		**PROPELLER PARTS - HC-A3MVK-2, -2A, -2B, -2BL, -2C - CONTINUED**				
700	840-77	• PCP: HUB UNIT, HC-A3_K-		1		PCP
720	A-1496	• • PILOT TUBE, REPLACED BY ITEM 720A		3		
720A	C-7080	• • PILOT TUBE, REPLACES ITEM 720		3		
730	B-7070-17	• • PLUG, CUPPED, STEEL - USED WITH ITEM 720A		3	Y	
750	B-3840-( )	• SCREW, 10-32, FILLISTER HEAD		A/R	Y	
760	A-48	• BALANCE WEIGHT		A/R	Y	
850	B-3384-4H	• BOLT, 1/4-28, HEX HEAD		6	Y	
890	A-1333-3	• BOLT, MOUNTING,1/2-20, HEX HEAD		2	Y	
890A	A-1328	• BOLT, MOUNTING, 1/2-20, 12 POINT		2	Y	
900	830-9B	• START LOCK ASSEMBLY (REFER TO “830-9B: START LOCK ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	-2, -2A, -2B, -2C	3		
	830-9L	• START LOCK ASSEMBLY (REFER TO “830-9L: START LOCK ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	-2BL	3		
1060	834-1	• GUIDE COLLAR UNIT (REFER TO “834-1: GUIDE COLLAR UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	-2, -2A, -2B, -2C	1		
	834-1L	• GUIDE COLLAR UNIT (REFER TO “834-1L: GUIDE COLLAR UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	-2BL	1		
1260	B-1322	• SHIM, MOUNTING, “K” FLANGE		1		
-1290	B-3851-0463	• WASHER	-2BL	6	Y	
1400	A-881	• PLATE, START LOCK		3		
1410	B-3873-H5A	• BOLT, HEX HEAD		6	Y	
1420	B-3851-0363	• WASHER - USED WITH 1410	-2A, -2B	18	Y	

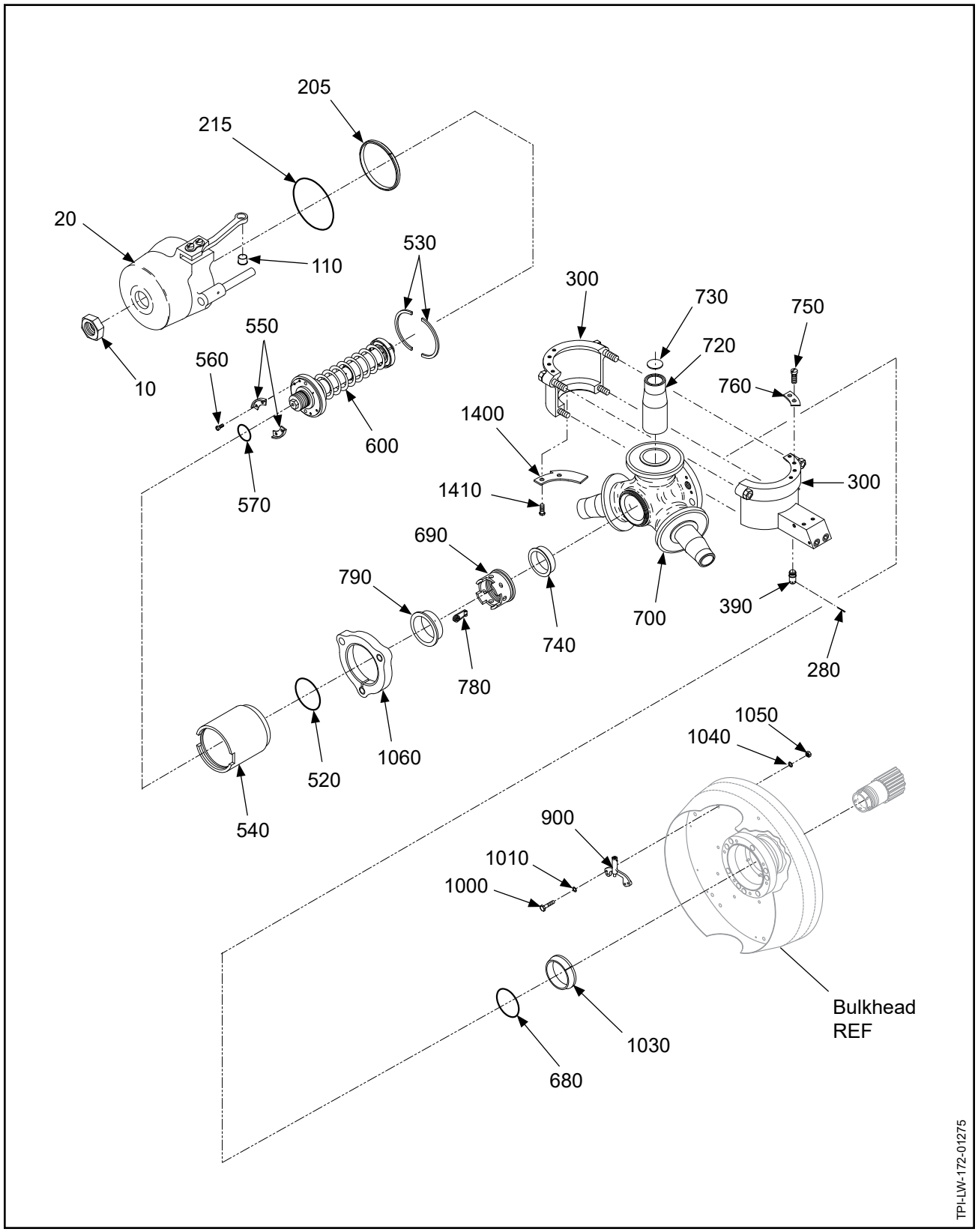
EFFECTIVITY	MODEL	EFFECTIVITY	MODEL
-2	HC-A3MVK-2	-2B	HC-A3MVK-2B
-2A	HC-A3MVK-2A	-2BL	HC-A3MVK-2BL
		-2C	HC-A3MVK-2C

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-16		**PROPELLER PARTS - HC-A3MVK-2, -2A, -2B, -2BL, -2C - CONTINUED**				
		BLADE RETENTION PARTS				
		(REFER TO “BLADE RETENTION PARTS” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)				
		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				

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED



HC-A3V20-2, -2L: Propeller Parts
Figure 10-17

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-17		**PROPELLER PARTS - HC-A3V20-2, -2L**				
10	A-880-1	• NUT, HEX, SELF-LOCKING, THIN		1	Y	
20	832-14	• PISTON ASSEMBLY (REFER TO "832-14 PISTON ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
110	A-944	• SLEEVE, LINKSCREW		3	Y	
205	B-1843	• SEAL, DUST, PISTON		1	Y	
215	C-3317-343-1	• O-RING, PISTON		1	Y	
280	B-3838-3-3	• COTTER PIN		3	Y	
300	838-6	• CLAMP ASSEMBLY "V" SERIES REPLACED BY ITEM 300A (REFER TO "838-6: PCP: CLAMP ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	A, C	3		
300A	838-18	• PCP: CLAMP ASSEMBLY "V" SERIES REPLACED BY ITEM 300C (REFER TO "838-18: PCP: CLAMP ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	B	3		PCP
300B	838-23	• PCP: CLAMP ASSEMBLY "V" SERIES REPLACED BY ITEM 300E (REFER TO "838-23: PCP: CLAMP ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	D	3		PCP
300C	838-23L	• PCP: CLAMP ASSEMBLY "V" SERIES REPLACED BY ITEM 300E (REFER TO "838-23L: PCP: CLAMP ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	E	3		PCP
300D	838-52	• PCP: CLAMP ASSEMBLY "V" SERIES REPLACED BY ITEM 300E (REFER TO "838-52: PCP: CLAMP ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	F	3		PCP
-385	A-6119	• BUSHING, LINK ARM - OPTIONAL		3	Y	
390	A-304	• LINKSCREW, 1/2-20		3	Y	
520	C-3317-235	• O-RING, CYLINDER		1	Y	
530	A-859	• KEEPER, SPLIT, FRONT		1		
540	B-854	• CYLINDER		1		
550	A-899-( )	• SPACER, STOP, PITCH		2		
560	B-3840-6	• SCREW, 10-32, FILLISTER HEAD		4	Y	
570	C-3317-020	• O-RING, PITCH CHANGE ROD		1	Y	
600	831-84	• FEATHERING SPRING ASSEMBLY (REFER TO "838-84: FEATHERING SPRING ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
680	C-3317-229	• O-RING, HUB MOUNTING		1	Y	

EFFECTIVITY	MODEL
A	HC-A3V20-2/V8433-( )
B	HC-A3V20-2L/LV8433-( )
C	HC-A3V20-2/V8833-( )

EFFECTIVITY	MODEL
D	HC-A3V20-2/V9333-( ) ALL BEECH EXCEPT TWIN BONANZA, LYCOMING GO-480-C2C6, -C2D6
E	HC-A3V20-2L/LV9333-( )
F	HC-A3V20-2/V9333-( ) BEECH TWIN BONANZA, LYCOMING GO-480-C2C6, -C2D6 ONLY

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-17		**PROPELLER PARTS - HC-A3V20-2, -2L - CONTINUED**				
690	A-63B	• PCP: NUT, SHAFT, 20 SPLINE - USE WITH ITEM 790 SUPERSEDED BY ITEM 690A		1		PCP
690A	B-2063	• PCP: NUT, SHAFT, 20 SPLINE - USE WITH ITEM 790 SUPERSEDES ITEM 690		1		PCP
700	840-85	• PCP: HUB UNIT, HC-(A,D)3_20-		1		PCP
720	A-1496	• •PILOT TUBE, REPLACED BY ITEM 720A		3		
720A	C-7080	• •PILOT TUBE, REPLACES ITEM 720		3		
730	B-7070-17	• •PLUG, CUPPED, STEEL - USED WITH ITEM 720A		3	Y	
-740	A-155	• •HUB BUSHING, SHAFT		1		
750	B-3840-( )	• SCREW, 10-32, FILLISTER HEAD		A/R	Y	
760	A-48	• BALANCE WEIGHT		A/R	Y	
780	A-847	• SAFETY PIN, SHAFT NUT		1		
790	A-870	• RING, PULLER, HUB		1	Y	
900	830-5	• START LOCK ASSEMBLY (REFER TO “830-5: START LOCK ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	A, C, D	3		
	830-5L	• START LOCK ASSEMBLY (REFER TO “830-5L: START LOCK ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	B, E	3		
	830-18	• START LOCK ASSEMBLY (REFER TO “830-18: START LOCK ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	F	3		
1000	B-3384-18	• BOLT, 1/4-28, HEX HEAD		6	Y	
1010	B-3851-0463	• WASHER		6	Y	
1030	A-50-3	• CONE, MOUNTING, REAR, 20 SPLINE		1		
1040	B-3851-0432	• WASHER		6	Y	
1050	B-3808-4	• NUT, HEX, SELF-LOCKING		6	Y	
1060	834-1	• GUIDE COLLAR UNIT (REFER TO “834-1: GUIDE COLLAR UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
1400	A-881	• PLATE, START LOCK		3		
1410	A-2016	• BOLT, 10-32, HEX HEAD		6	Y	

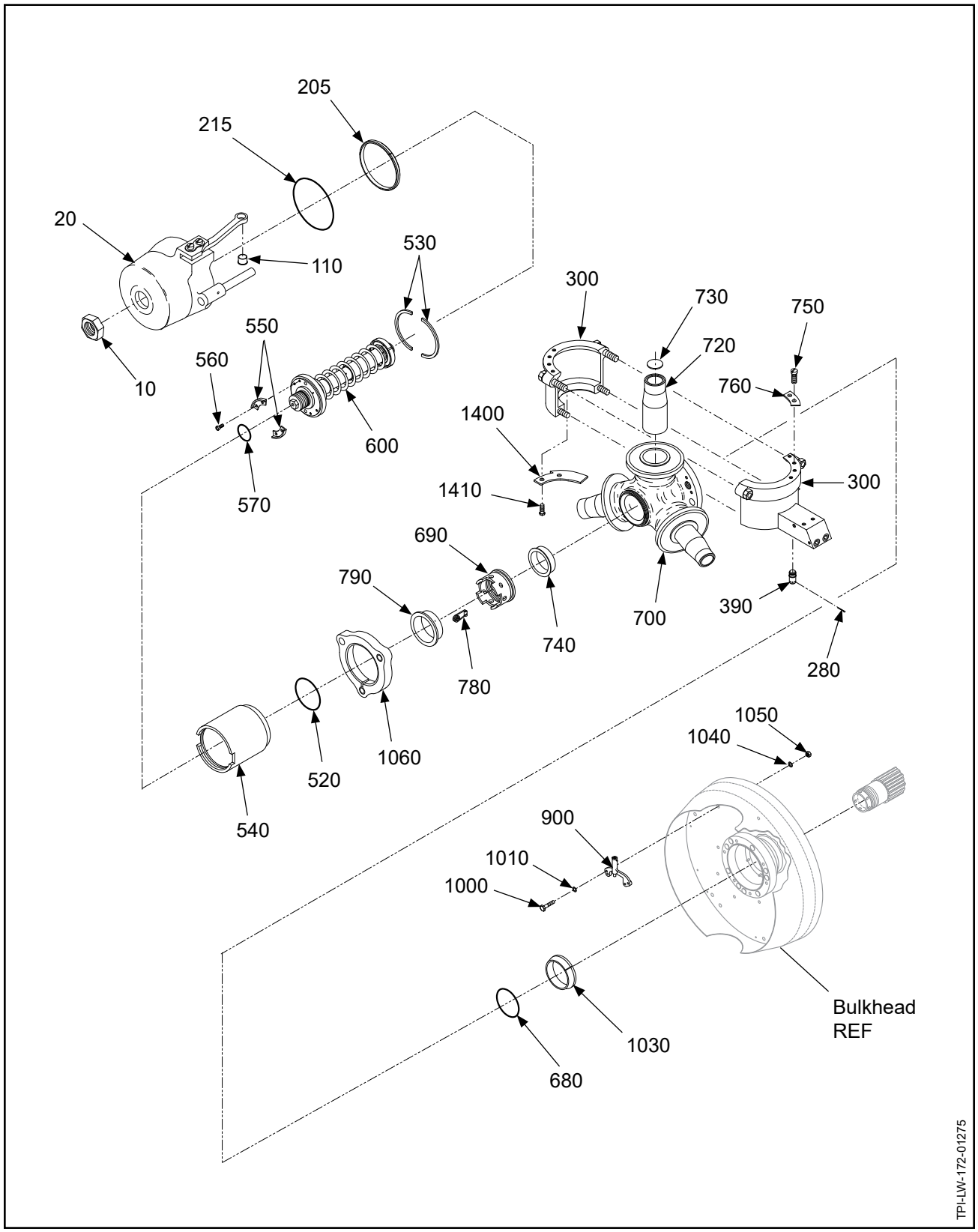
EFFECTIVITY	MODEL
A	HC-A3V20-2/V8433-( )
B	HC-A3V20-2L/LV8433-( )
C	HC-A3V20-2/V8833-( )
D	HC-A3V20-2/V9333-( ) ALL BEECH EXCEPT TWIN BONANZA, LYCOMING GO-480-C2C6, -C2D6
E	HC-A3V20-2L/LV9333-( )
F	HC-A3V20-2/V9333-( ) BEECH TWIN BONANZA, LYCOMING GO-480-C2C6, -C2D6 ONLY

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-17		**PROPELLER PARTS - HC-A3V20-2, -2L - CONTINUED**				
		BLADE RETENTION PARTS				
		(REFER TO “BLADE RETENTION PARTS” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)				
		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				

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED



HC-A3MV20-2, -2L: Propeller Parts
Figure 10-18

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-18		**PROPELLER PARTS - HC-A3MV20-2, -2L**				
10	A-880-1	• NUT, HEX, SELF-LOCKING, THIN		1	Y	
20	832-14	• PISTON ASSEMBLY (REFER TO "832-14 PISTON ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
110	A-944	• SLEEVE, LINKSCREW		2	Y	
205	B-1843	• SEAL, DUST, PISTON		1	Y	
215	C-3317-343-1	• O-RING, PISTON		1	Y	
280	B-3838-3-3	• COTTER PIN		3	Y	
300	838-1006	• PCP: CLAMP ASSEMBLY "V" SERIES (REFER TO "838-1006: PCP: CLAMP ASSEMBLY"	A, C	3		PCP
	838-1018	• PCP: CLAMP ASSEMBLY "V" SERIES (REFER TO "838-1018: PCP: CLAMP ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	B	3		PCP
	838-1023	• PCP: CLAMP ASSEMBLY "V" SERIES (REFER TO "838-1023: PCP: CLAMP ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	D	3		PCP
	838-1023L	• PCP: CLAMP ASSEMBLY "V" SERIES (REFER TO "838-1023L: PCP: CLAMP ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	E	3		PCP
	838-1052	• PCP: CLAMP ASSEMBLY "V" SERIES (REFER TO "838-1052: PCP: CLAMP ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	F	3		PCP
-385	A-6119	• •BUSHING, LINK ARM - OPTIONAL		3	Y	
390	A-304	• LINKSCREW, 1/2-20		3	Y	
520	C-3317-235	• O-RING, CYLINDER		1	Y	
530	A-859	• KEEPER, SPLIT, FRONT		1		
540	B-854	• CYLINDER		1		
550	A-899-( )	• SPACER, STOP, PITCH		2		
560	B-3840-6	• SCREW, 10-32, FILLISTER HEAD, FEATHERING STOP MOUNTING		4	Y	
570	C-3317-020	• O-RING, PITCH CHANGE ROD		1	Y	
600	831-84	• FEATHERING SPRING ASSEMBLY (REFER TO "838-84: FEATHERING SPRING ASSEMBLY" IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
680	C-3317-229	• O-RING, HUB MOUNTING		1	Y	
690	A-63B	• PCP: NUT, SHAFT, 20 SPLINE - USE WITH ITEM 790 SUPERSEDED BY ITEM 690A		1		PCP

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-18		PROPELLER PARTS - HC-A3MV20-2, -2L - CONTINUED				
700	840-85	• PCP: HUB UNIT, HC-(A,D)3_20-		1		PCP
720	A-1496	• •PILOT TUBE- REPLACED BY ITEM 720A		3		
720A	C-7080	• •PILOT TUBE- REPLACES ITEM 720		3		
730	B-7070-17	• •PLUG, CUPPED, STEEL - USED WITH ITEM 720A		3	Y	
740	A-155	• •HUB BUSHING, SHAFT		1		
750	B-3840-( )	• SCREW, 10-32, FILLISTER HEAD		A/R	Y	
760	A-48	• BALANCE WEIGHT		A/R	Y	
780	A-847	• SAFETY PIN, SHAFT NUT		1	Y	
790	A-870	• RING, PULLER, HUB		1		
900	830-5	• START LOCK ASSEMBLY (REFER TO “830-5: START LOCK ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	A, C, D	3		
	830-5L	• START LOCK ASSEMBLY (REFER TO “830-5L: START LOCK ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	B, E	3		
	830-18	• START LOCK ASSEMBLY (REFER TO “830-18: START LOCK ASSEMBLY” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)	F	3		
1000	B-3384-18	• BOLT, 1/4-28, HEX HEAD		6	Y	
1010	B-3851-0463	• WASHER		6	Y	
1030	A-50-3	• CONE, MOUNTING, REAR, 20 SPLINE		1		
1040	B-3851-0432	• WASHER		6	Y	
1050	B-3808-4	• NUT, HEX, SELF-LOCKING		6	Y	
1060	834-2A	• GUIDE COLLAR UNIT (REFER TO “834-2A: GUIDE COLLAR UNIT” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)		1		
1400	A-881	• PLATE, START LOCK		3		
1410	A-2016	• BOLT, 10-32, HEX HEAD		6	Y	

EFFECTIVITY	MODEL
A	HC-A3MV20-2/V8433-( )
B	HC-A3MV20-2L/LV8433-( )
C	HC-A3MV20-2/V8833-( )
D	HC-A3MV20-2/V9333-( ) ALL BEECH EXCEPT TWIN BONANZA, LYCOMING GO-480-C2C6, -C2D6
E	HC-A3MV20-2L/LV9333-( )
F	HC-A3MV20-2/V9333-( ) BEECH TWIN BONANZA, LYCOMING GO-480-C2C6, -C2D6 ONLY

- ITEM NOT ILLUSTRATED

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10-18		**PROPELLER PARTS - HC-A3MV20-2, -2L - CONTINUED**				
		BLADE RETENTION PARTS				
		(REFER TO “BLADE RETENTION PARTS” IN THIS CHAPTER FOR EXPLODED VIEW/PARTS LIST)				
		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				

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

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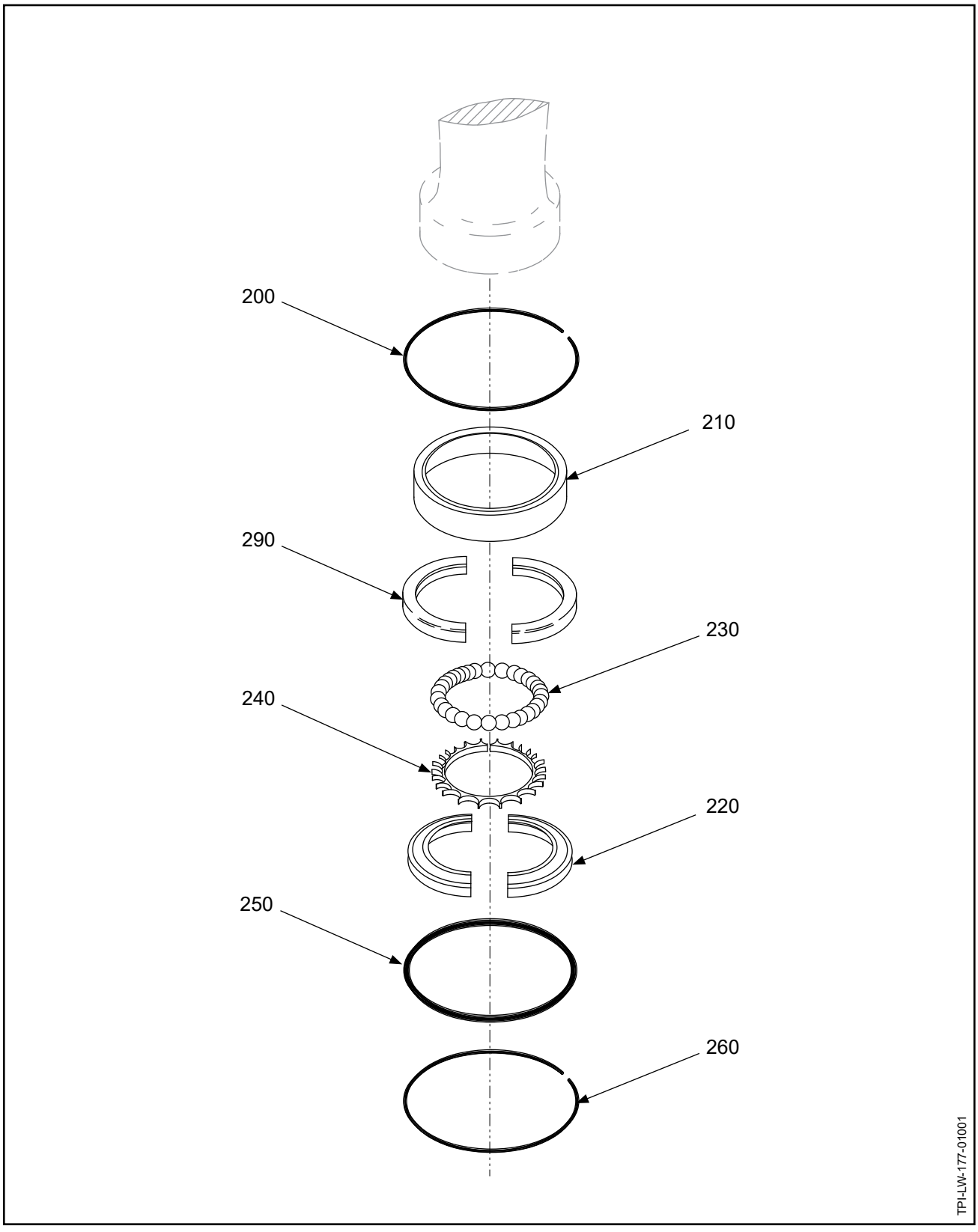
SUB-ASSEMBLY
PARTS LISTS and FIGURES



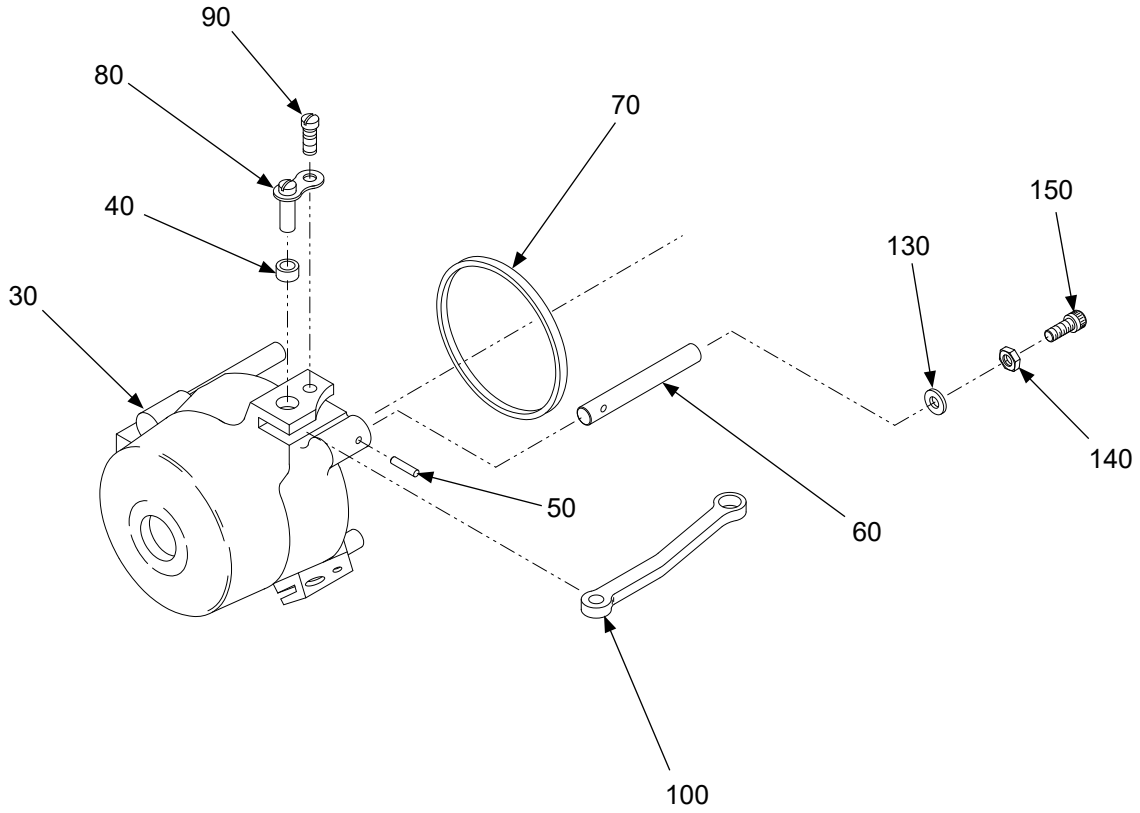
Blade Retention Parts
Figure 10A-1

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-1		**BLADE RETENTION PARTS**				
		All quantities (UPA) in this parts list are per blade assembly.				
200	A-974	RETAINER, RING, WIRE		1	Y	
210	A-972	RING, RETAINING, BEARING		1		
220	A-971-A	RACE, INBOARD		1		
230	B-6144-2	BALL, BEARING, 9/16" DIA		17	Y	
	B-6144-2-450	BALL, BEARING, 9/16" DIA (450 PIECE BOX)		RF		
240	A-311	BALL SPACER		1	Y	
250	A-2027	RETAINER, BEARING, WIRE		1	Y	
260	C-3317-230	O-RING, BLADE		1	Y	
290	A-971-B	RACE, OUTBOARD		1		

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

Blade Retention Parts



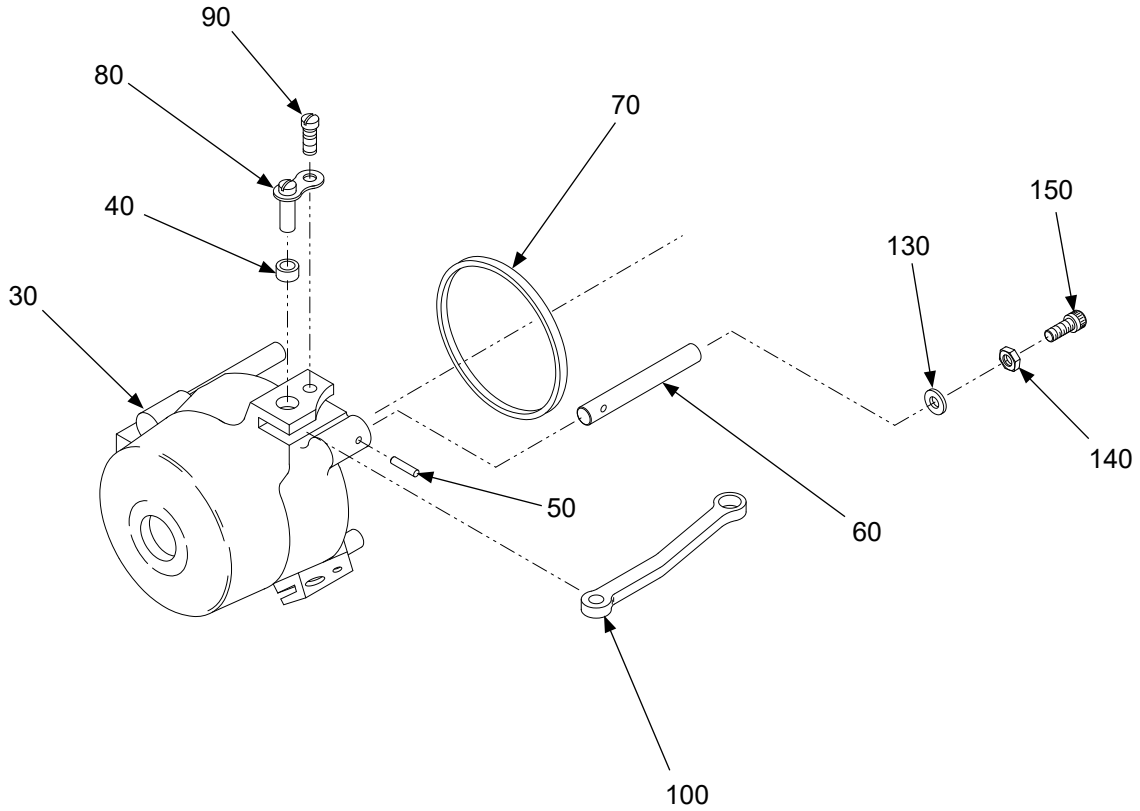
832-14: Piston Assembly
Figure 10A-2

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-2		**832-14: PISTON ASSEMBLY**				
-20	832-14	PISTON ASSEMBLY		1		
30	C-1401-3	• PISTON UNIT		1		
40	A-946	• • BUSHING, BRONZE (EARLIER MODELS)		3		
50	A-114-E	• • DOWEL PIN		3		
60	A-817-2	• • GUIDE ROD, PISTON		3		
70	A-862	• • BUSHING PLASTIC		1		
80	A-1464	• LINK PIN UNIT		3	Y	
-81	A-979	• • LINK		1		
-82	A-872-1	• • PIN, LINK		1		
90	B-3840-( )	• • SCREW, 10-32, FILLISTER HEAD		1	Y	
100	A-861-3	• LINK ARM		3		
130	A-1444	• WASHER, 5/16", (GUIDE ROD)		3	Y	
140	B-3368	• NUT, 5/16-24, HEX, THIN (GUIDE ROD)		3	Y	
150	A-2037	• SCREW, 5/16-24, CAP (GUIDE ROD)		3	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

832-14: Piston Assembly



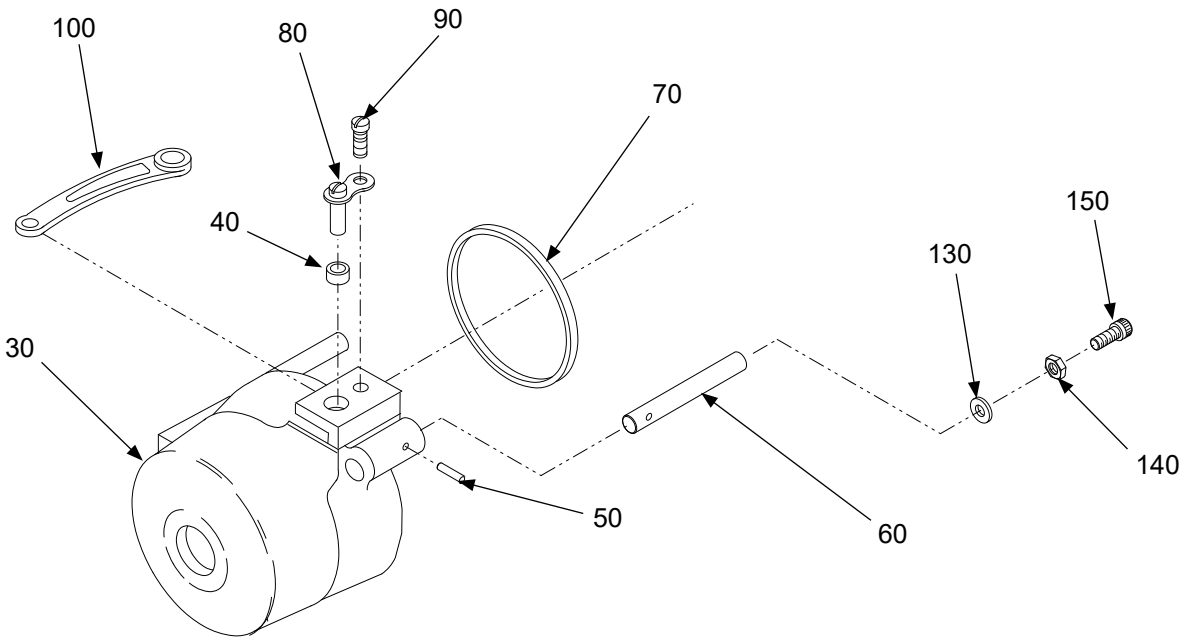
832-17: Piston Assembly
Figure 10A-3

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-3		**832-17: PISTON ASSEMBLY PARTS**				
-20	832-17	PISTON ASSEMBLY		1		
30	C-1401-2	• PISTON UNIT		1		
40	A-946	• • BUSHING, BRONZE (EARLIER MODELS)		3		
50	A-114-E	• • DOWEL PIN		3		
60	A-817-2	• • ROD, GUIDE, PISTON		3		
70	A-862	• • BUSHING, PLASTIC		1		
80	A-1464	• LINK PIN UNIT		2	Y	
90	B-3840-6	• • SCREW, 10-32, FILLISTER HEAD		2	Y	
100	A-861-3	• • LINK ARM		2		
130	A-1444	• WASHER, 5/16", (GUIDE ROD)		3	Y	
140	B-3368	• NUT, 5/16-24, HEX, THIN (GUIDE ROD)		3	Y	
150	A-2037	• SCREW, 5/16-24, CAP (GUIDE ROD)		3	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

832-17: Piston Assembly



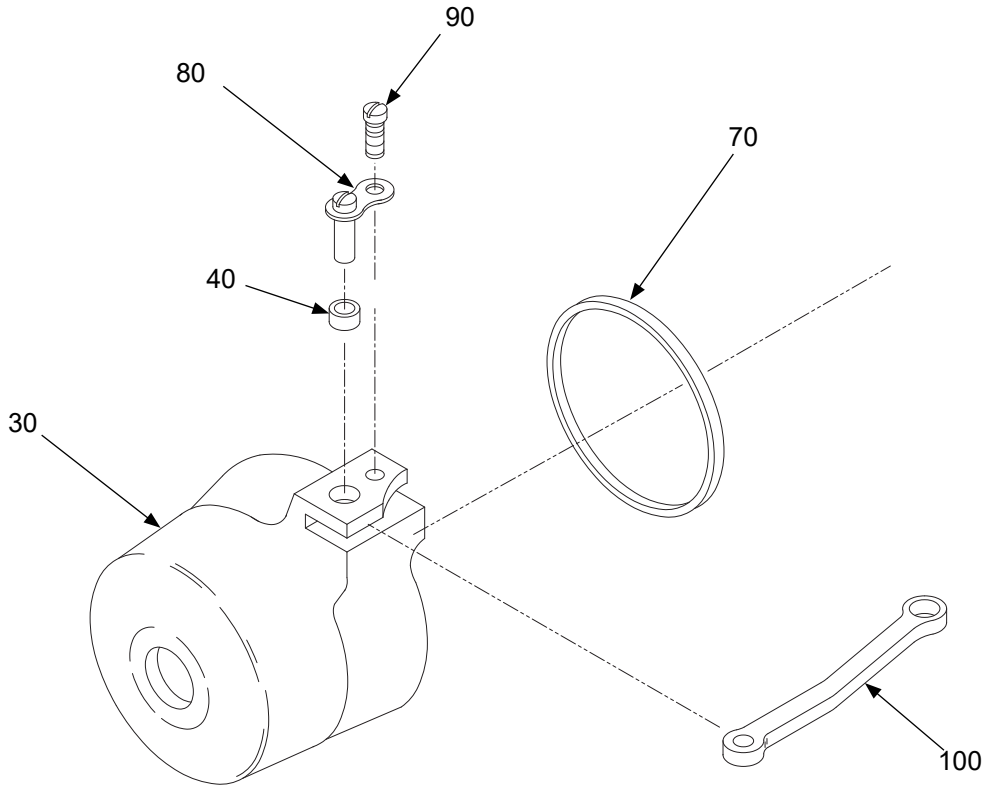
832-17L: Piston Assembly
Figure 10A-4

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-4		**832-17L: PISTON ASSEMBLY PARTS**				
-20	832-17L	PISTON ASSEMBLY		1		
30	C-1401-2L	• PISTON UNIT		1		
40	A-946	• • BUSHING, BRONZE (EARLIER MODELS)		3		
50	A-114-E	• • DOWEL PIN		3		
60	A-817-2	• • ROD, GUIDE, PISTON		3		
70	A-862	• • BUSHING, PLASTIC		1		
80	A-1464	• LINK PIN UNIT		2	Y	
90	B-3840-( )	• • SCREW, 10-32, FILLISTER HEAD		2	Y	
100	A-861-3L	• • LINK ARM		2		
110	A-944	• SLEEVE, LINKSCREW - OPTIONAL		3	Y	
130	A-1444	• WASHER, 5/16", (GUIDE ROD)		3	Y	
-135	A-970	• SPACER - OPTIONAL		3	Y	
140	B-3368	• NUT, 5/16-24, HEX, THIN (GUIDE ROD)		3	Y	
150	A-2037	• SCREW, 5/16-24, CAP (GUIDE ROD)		3	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

832-17L: Piston Assembly



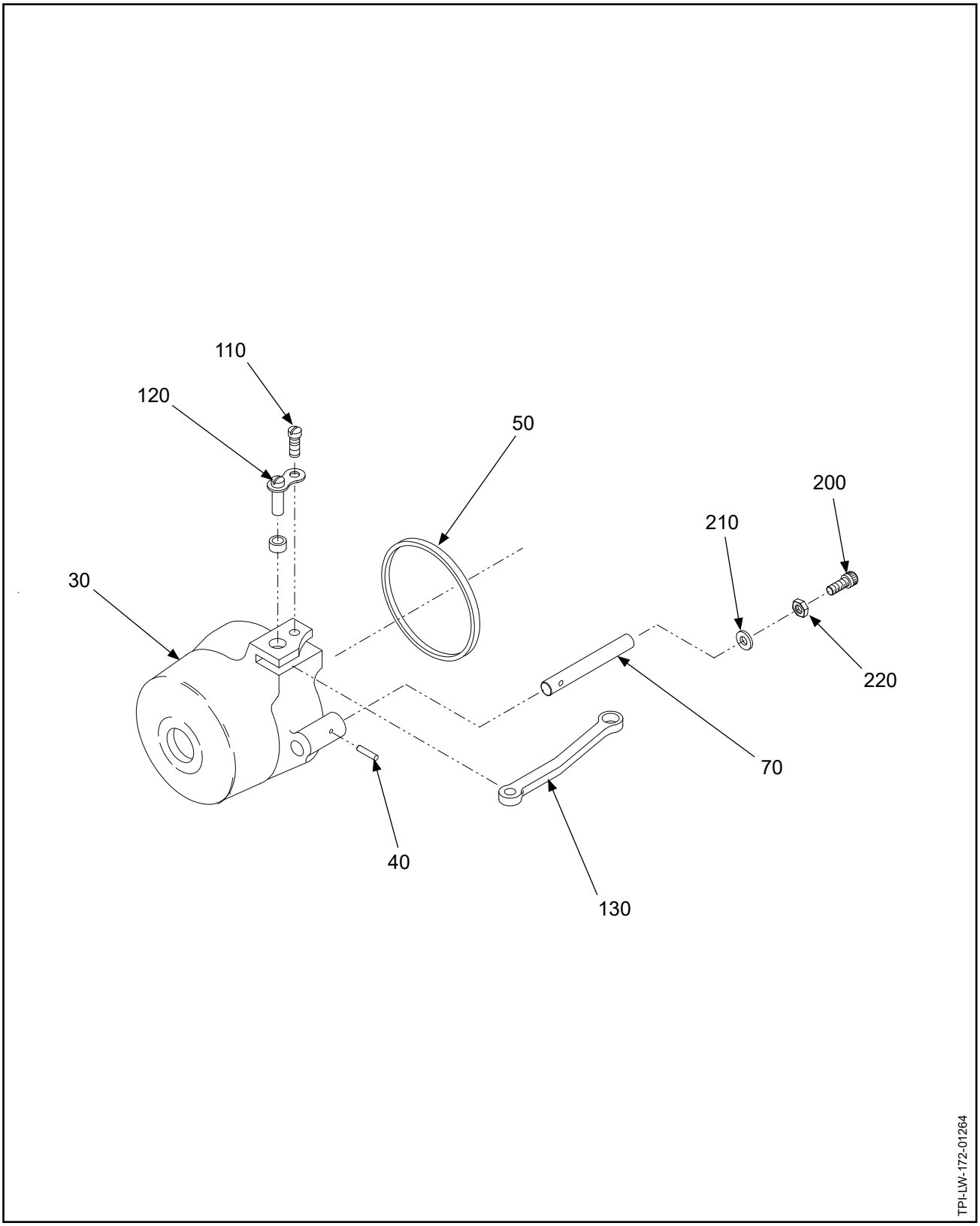
832-24: Piston Assembly
Figure 10A-5

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-5		**832-24: PISTON ASSEMBLY PARTS**				
-20	832-24	PISTON ASSEMBLY		1		
30	C-852-6	• PISTON UNIT		1		
40	A-946	• • BUSHING, BRONZE (EARLIER MODELS)		2		
70	A-862	• • BUSHING, PLASTIC		1		
80	A-1464	• LINK PIN UNIT		2	Y	
90	B-3840-( )	• • SCREW, 10-32, FILLISTER HEAD		2	Y	
100	A-861-3	• • LINK ARM		2		
130	A-1444	• WASHER, 5/16", (GUIDE ROD)		3	Y	
140	B-3368	• NUT, 5/16-24, HEX, THIN (GUIDE ROD)		3	Y	
150	A-2037	• SCREW, 5/16-24, CAP (GUIDE ROD)		3	Y	

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

832-24: Piston Assembly



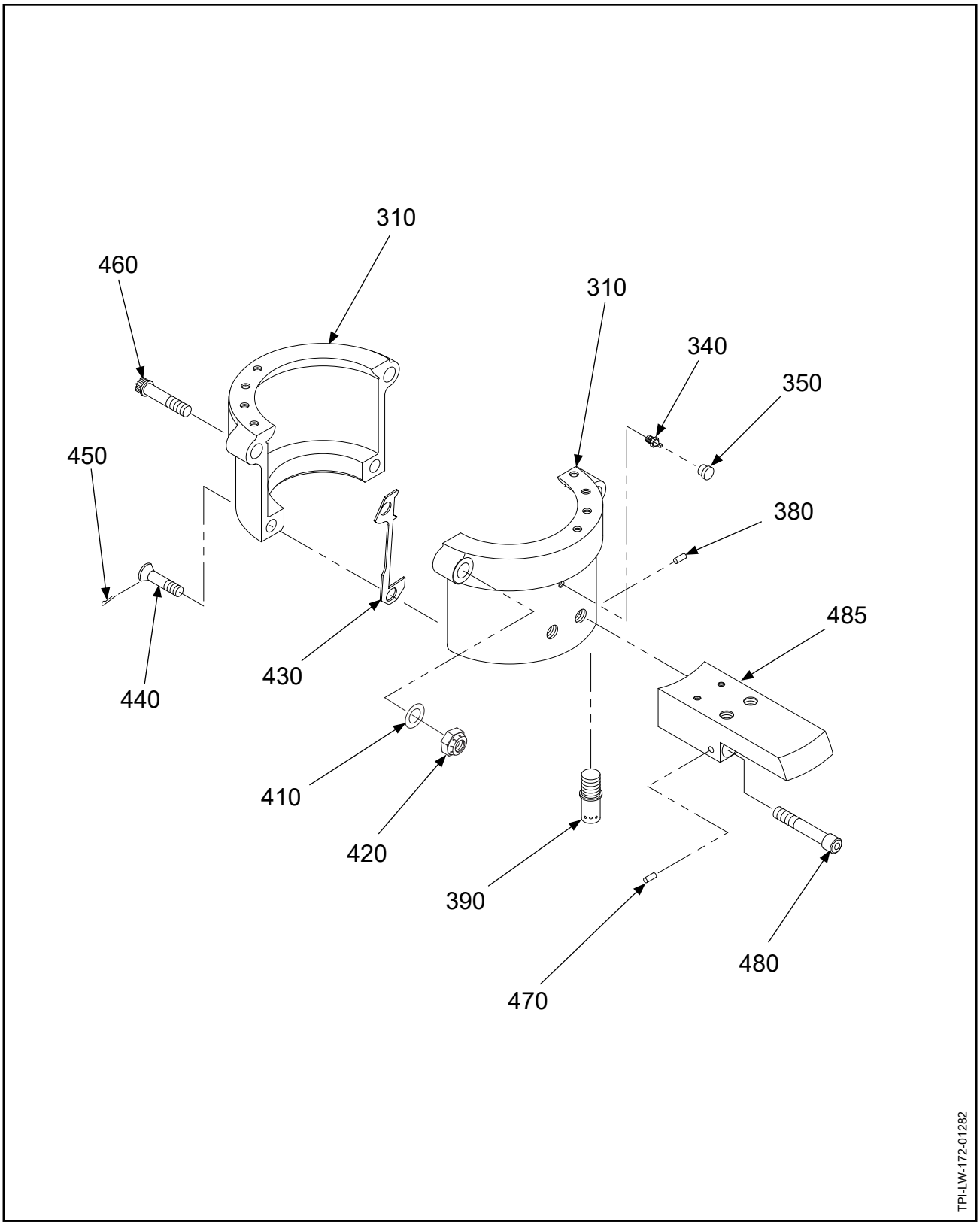
832-26: Piston Assembly
Figure 10A-6

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-6		**832-26: PISTON ASSEMBLY PARTS**				
-20	832-26	PISTON ASSEMBLY		1		
30	C-852-7	• PISTON UNIT		1		
40	A-946	• • BUSHING, BRONZE (EARLIER MODELS)		2		
70	A-862	• • BUSHING, PLASTIC		1		
80	A-1464	• LINK PIN UNIT		2	Y	
90	B-3840-( )	• • SCREW, 10-32, FILLISTER HEAD		2	Y	
100	A-861-3	• • LINK ARM		2		
120	A-817-2	• ROD, GUIDE, PISTON		2		
130	A-1444	• WASHER, 5/16"		2	Y	
140	B-3368	• NUT, 5/16-24, HEX, THIN		2	Y	
150	A-2037	• SCREW, 5/16-24, CAP		2	Y	
160	A-114E	• DOWEL PIN		2		

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

832-26: Piston Assembly



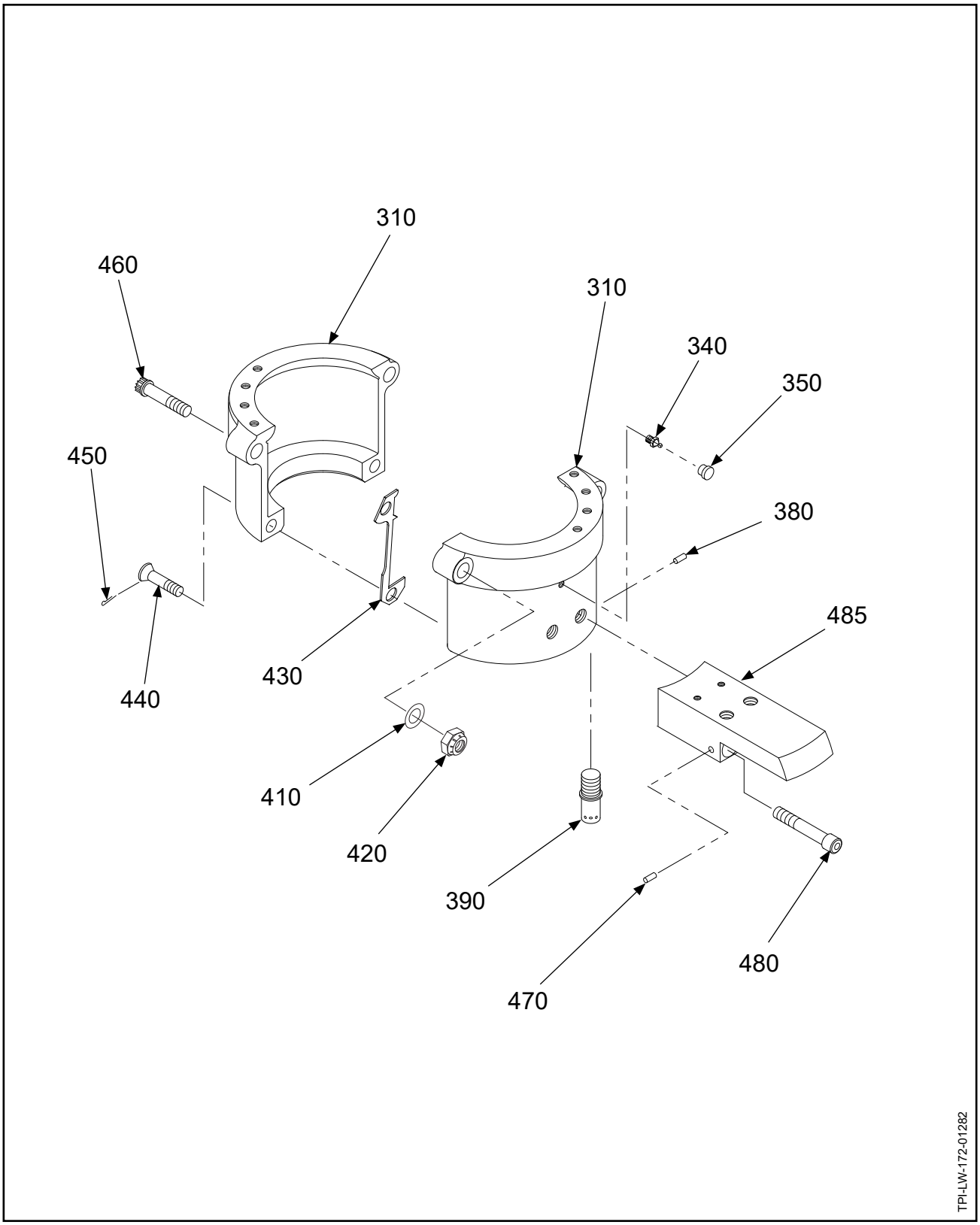
838-6: Clamp Assembly
Figure 10A-7

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-7		**838-6: CLAMP ASSEMBLY PARTS**				
-300	838-6	CLAMP ASSEMBLY "V" SERIES		1		
310	C-3-5A	• BLADE CLAMP		1		
340	B-6588-1	• FITTING, LUBRICATION		2	Y	
350	B-6544	• CAP, FITTING, LUBRICATION		2	Y	
-370	A-65	• DOWEL PIN, 1/4, REPLACED BY ITEM 375		1	Y	
-375	101375	• PLUG, PULL, REPLACES ITEM 370 POST HC-SB-61-285		AR	Y	
380	A-285	• SPRING PIN, 3/32", CRES		1	Y	
390	A-304	• LINKSCREW, 1/2-20		1	Y	
-410	A-2031	• WASHER, 3/8" - USED WITH ITEM 420		2	Y	
420	A-2043-1	• NUT, 3/8-24, HEX, SELF-LOCKING		2	Y	
430	A-47-1	• GASKET, CLAMP		2	Y	
440	A-321	• SCREW, 3/8-24 DOUBLE 60° HEAD, INBOARD CLAMP		2	Y	
450	B-3838-3-2	• COTTER PIN		2	Y	
460	A-2017	• BOLT, 3/8-24, 12 POINT, OUTBOARD CLAMP		2	Y	
470	A-285	• SPRING PIN, 3/32", CRES		2	Y	
-470A	B-3838-3-2	• COTTER PIN - ALTERNATE FOR ITEM 470		2	Y	
480	A-2036-30	• SCREW, 7/16-20, CAP, MODIFIED, COUNTERWEIGHT REPLACED BY ITEM 480A		2	Y	
480A	107995-30	• BOLT, 7/16-20, 12 POINT, REPLACES ITEM 480 (COUNTERWEIGHT)		2	Y	
485	833-4	• PCP: COUNTERWEIGHT UNIT		1		PCP

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

838-6: Clamp Assembly



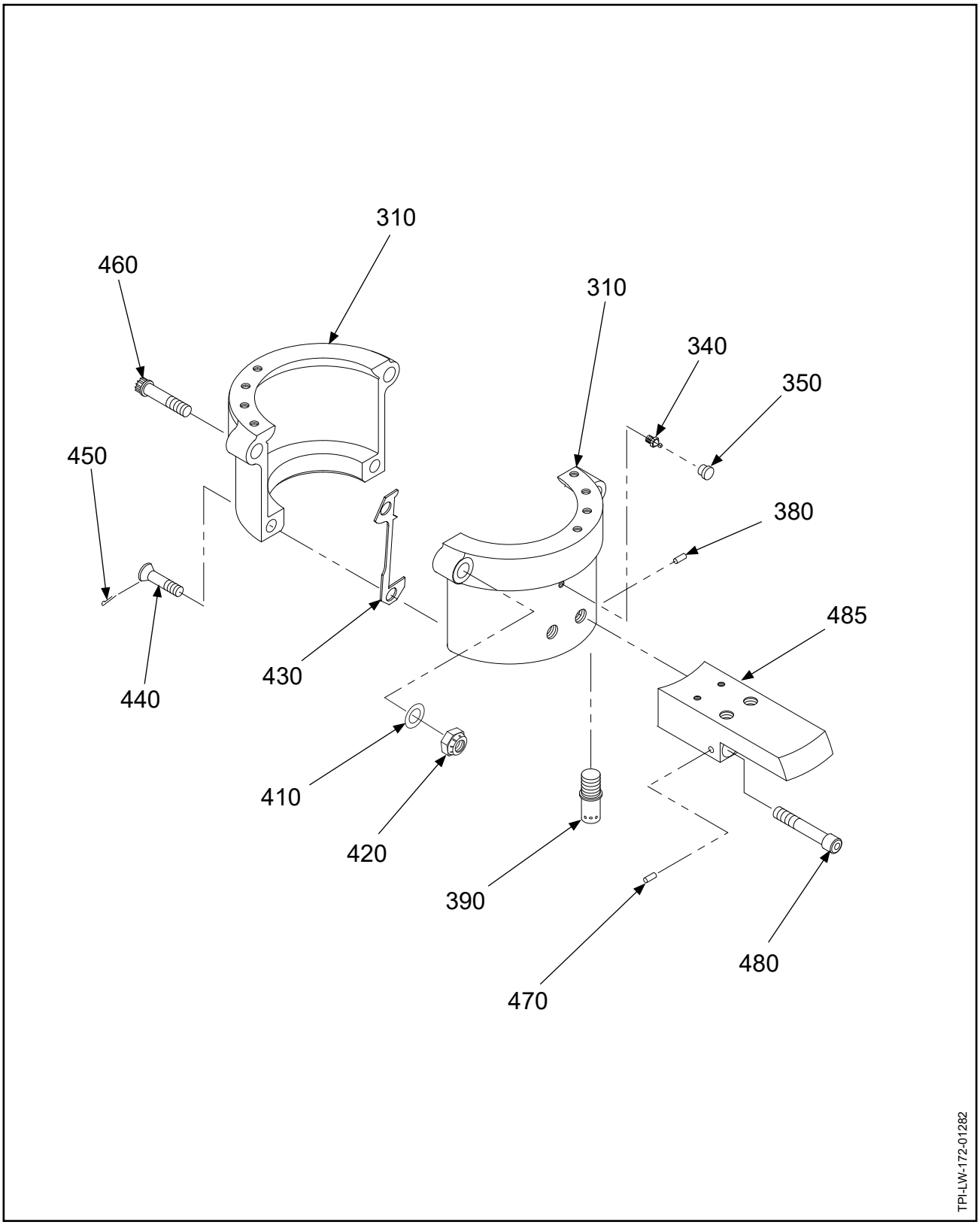
838-10: Clamp Assembly
Figure 10A-8

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-8		**838-10: CLAMP ASSEMBLY PARTS**				
-300	838-10	• CLAMP ASSEMBLY "V" SERIES		1		
310	C-3-5A	• • BLADE CLAMP		1		
340	B-6588-1	• • FITTING, LUBRICATION		2	Y	
350	B-6544	• • CAP, FITTING, LUBRICATION		2	Y	
-370	A-65	• • DOWEL PIN, 1/4, REPLACED BY ITEM 375		1	Y	
-375	101375	• • PLUG, PULL, REPLACES ITEM 370 POST HC-SB-61-285		AR	Y	
380	A-285	• • SPRING PIN, 3/32", CRES		1	Y	
390	A-304	• • LINKSCREW, 1/2-20		1	Y	
410	A-2031	• • WASHER, 3/8" - USED WITH ITEM 420		2	Y	
420	A-2043-1	• • NUT, 3/8-24, HEX, SELF-LOCKING		2	Y	
430	A-47-1	• • GASKET, CLAMP		2	Y	
440	A-321	• • SCREW, 3/8-24 DOUBLE 60° HEAD, INBOARD CLAMP		2	Y	
450	B-3838-3-2	• • COTTER PIN		2	Y	
460	A-2017	• • BOLT, 3/8-24, 12 POINT, OUTBOARD CLAMP		2	Y	
470	A-285	• • SPRING PIN, 3/32", CRES		2	Y	
-470A	B-3838-3-2	• • COTTER PIN - ALTERNATE FOR ITEM 470		2	Y	
480	A-2036-30	• • SCREW, 7/16-20, CAP, MODIFIED, COUNTERWEIGHT REPLACED BY ITEM 480A		2	Y	
480A	107995-30	• • BOLT, 7/16-20, 12 POINT, REPLACES ITEM 480 (COUNTERWEIGHT)		2	Y	
485	833-2	• • PCP: COUNTERWEIGHT UNIT		1		PCP

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

838-10: Clamp Assembly



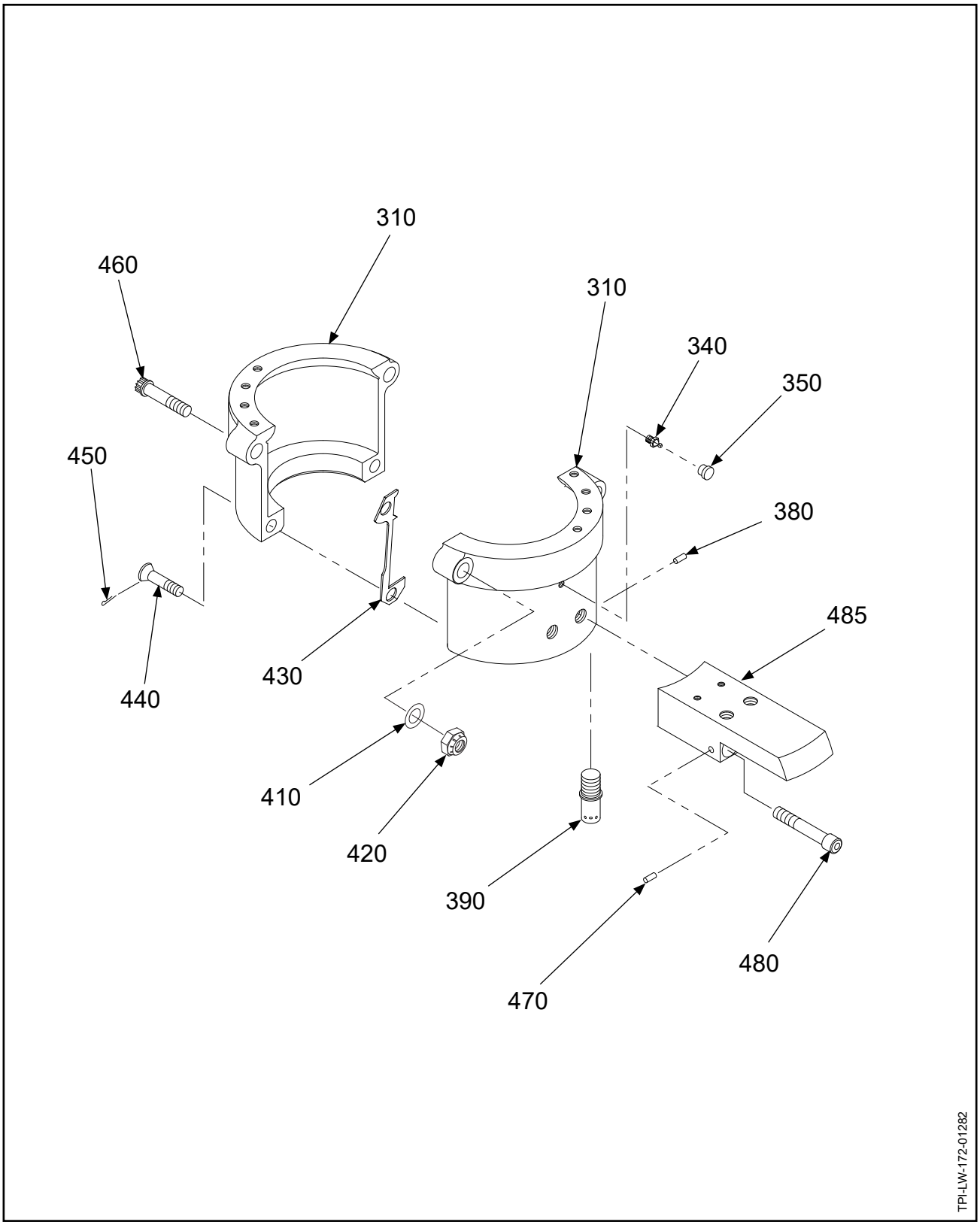
838-11: Clamp Assembly
Figure 10A-9

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-9		**838-11: CLAMP ASSEMBLY PARTS**				
-300	838-11A	CLAMP ASSEMBLY "V" SERIES		1		
310	C-3-5A	• BLADE CLAMP		1		
340	B-6588-1	• FITTING, LUBRICATION		2	Y	
350	B-6544	• CAP, FITTING, LUBRICATION		2	Y	
-370	A-65	• DOWEL PIN, 1/4, REPLACED BY ITEM 375		1	Y	
-375	101375	• PLUG, PULL, REPLACES ITEM 370 POST HC-SB-61-285		AR	Y	
380	A-285	• SPRING PIN, 3/32", CRES		1	Y	
390	A-304	• LINKSCREW, 1/2-20		1	Y	
-410	A-2031	• WASHER, 3/8" - USED WITH ITEM 420		2	Y	
420	A-2043-1	• NUT, 3/8-24, HEX, SELF-LOCKING		2	Y	
430	A-47-1	• GASKET, CLAMP		2	Y	
440	A-321	• SCREW, 3/8-24 DOUBLE 60° HEAD, INBOARD CLAMP		2	Y	
450	B-3838-3-2	• COTTER PIN		2	Y	
460	A-2017	• BOLT, 3/8-24, 12 POINT, OUTBOARD CLAMP		2	Y	
470	A-285	• SPRING PIN, 3/32", CRES		2	Y	
-470A	B-3838-3-2	• COTTER PIN - ALTERNATE FOR ITEM 470		2	Y	
480	A-2036-30	• SCREW, 7/16-20, CAP, MODIFIED, COUNTERWEIGHT REPLACED BY ITEM 480A		2	Y	
480A	107995-30	• BOLT, 7/16-20, 12 POINT, REPLACES ITEM 480 (COUNTERWEIGHT)		2	Y	
485	B-271-1	• PCP: COUNTERWEIGHT		1		PCP

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

838-11: Clamp Assembly



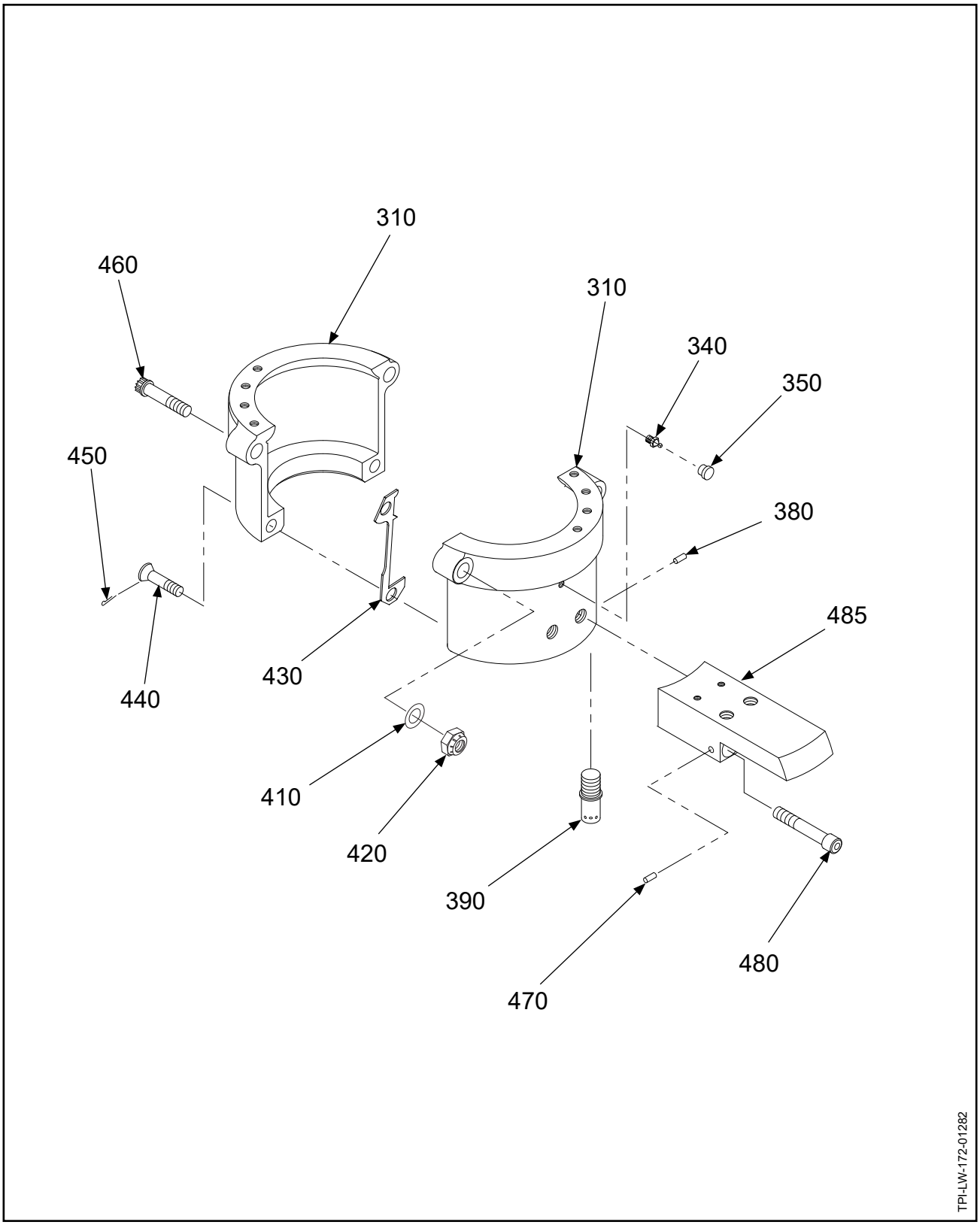
838-11A: Clamp Assembly
Figure 10A-10

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-10		**838-11A: CLAMP ASSEMBLY PARTS**				
-300	838-11A	CLAMP ASSEMBLY "V" SERIES		1		
310	C-3-5A	• BLADE CLAMP		1		
340	B-6588-1	• FITTING, LUBRICATION		2	Y	
350	B-6544	• CAP, FITTING, LUBRICATION		2	Y	
-370	A-65	• DOWEL PIN, 1/4, REPLACED BY ITEM 375		1	Y	
-375	101375	• PLUG, PULL, REPLACES ITEM 370 POST HC-SB-61-285		AR	Y	
380	A-285	• SPRING PIN, 3/32", CRES		1	Y	
390	A-304	• LINKSCREW, 1/2-20		1	Y	
-410	A-2031	• WASHER, 3/8" - USED WITH ITEM 420		2	Y	
420	A-2043-1	• NUT, 3/8-24, HEX, SELF-LOCKING		2	Y	
430	A-47-1	• GASKET, CLAMP		2	Y	
440	A-321	• SCREW, 3/8-24 DOUBLE 60° HEAD, INBOARD CLAMP		2	Y	
450	B-3838-3-2	• COTTER PIN		2	Y	
460	A-2017	• BOLT, 3/8-24, 12 POINT, OUTBOARD CLAMP		2	Y	
470	A-285	• SPRING PIN, 3/32", CRES		2	Y	
-470A	B-3838-3-2	• COTTER PIN - ALTERNATE FOR ITEM 470		2	Y	
480	A-2036-30	• SCREW, 7/16-20, CAP, MODIFIED, COUNTERWEIGHT REPLACED BY ITEM 480A		2	Y	
480A	107995-30	• BOLT, 7/16-20, 12 POINT, REPLACES ITEM 480 (COUNTERWEIGHT)		2	Y	
485	B-271-1A	• PCP: COUNTERWEIGHT		1		PCP

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

838-11A: Clamp Assembly



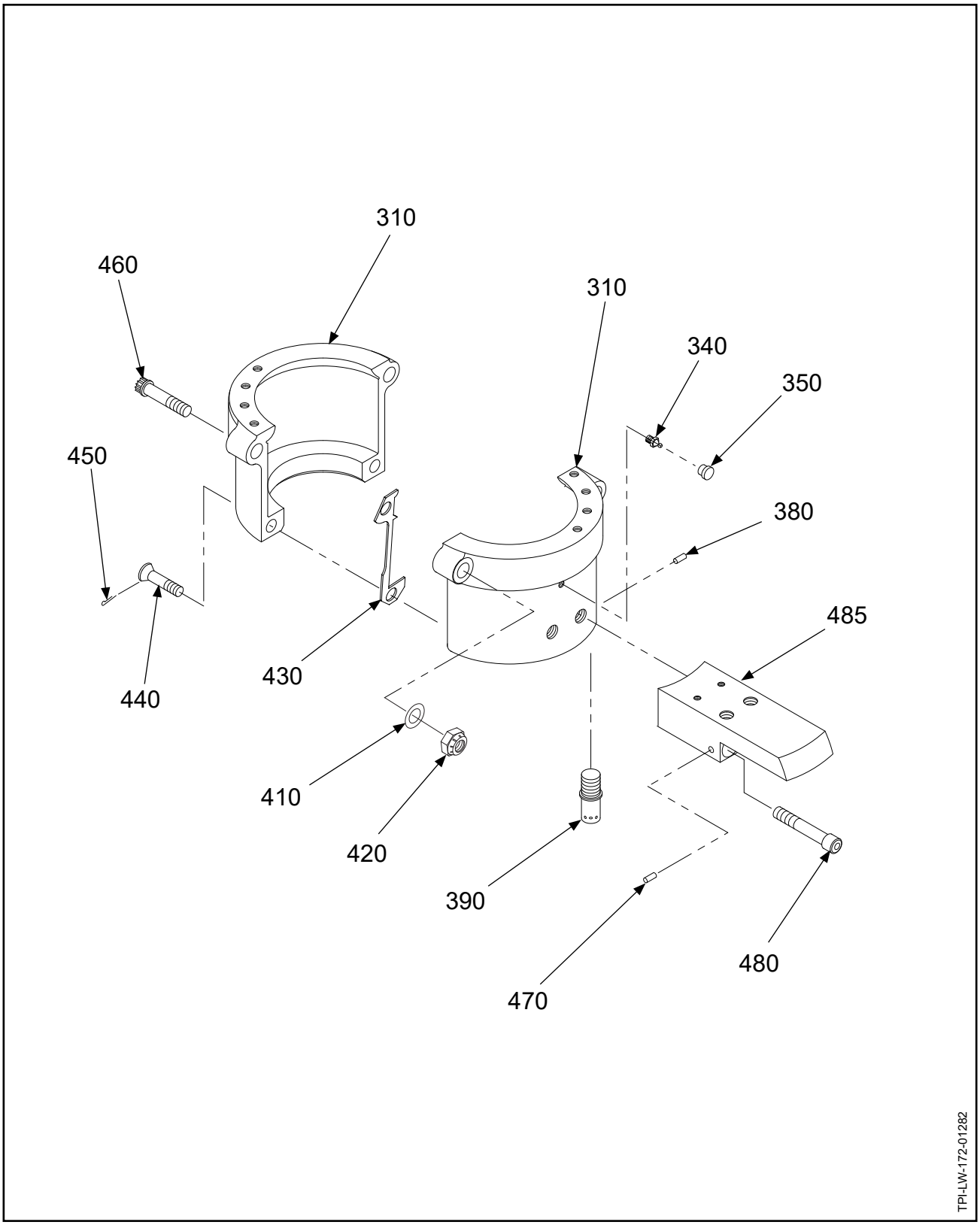
838-11AL: Clamp Assembly
Figure 10A-11

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-11		**838-11AL: CLAMP ASSEMBLY PARTS**				
-300	838-11AL	CLAMP ASSEMBLY "V" SERIES		1		
310	C-3-5A	• BLADE CLAMP		1		
340	B-6588-1	• FITTING, LUBRICATION		2	Y	
350	B-6544	• CAP, FITTING, LUBRICATION		2	Y	
-370	A-65	• DOWEL PIN, 1/4, REPLACED BY ITEM 375		1	Y	
-375	101375	• PLUG, PULL, REPLACES ITEM 370 POST HC-SB-61-285		AR	Y	
380	A-285	• SPRING PIN, 3/32", CRES		1	Y	
390	A-304	• LINKSCREW, 1/2-20		1	Y	
-410	A-2031	• WASHER, 3/8" - USED WITH ITEM 420		2	Y	
420	A-2043-1	• NUT, 3/8-24, HEX, SELF-LOCKING		2	Y	
430	A-47-1	• GASKET, CLAMP		2	Y	
440	A-321	• SCREW, 3/8-24 DOUBLE 60° HEAD, INBOARD CLAMP		2	Y	
450	B-3838-3-2	• COTTER PIN		2	Y	
460	A-2017	• BOLT, 3/8-24, 12 POINT, OUTBOARD CLAMP		2	Y	
470	A-285	• SPRING PIN, 3/32", CRES		2	Y	
-470A	B-3838-3-2	• COTTER PIN - ALTERNATE FOR ITEM 470		2	Y	
480	A-2036-30	• SCREW, 7/16-20, CAP, MODIFIED, COUNTERWEIGHT REPLACED BY ITEM 480A		2	Y	
480A	107995-30	• BOLT, 7/16-20, 12 POINT, REPLACES ITEM 480 (COUNTERWEIGHT)		2	Y	
485	B-271-1A	• PCP: COUNTERWEIGHT		1		PCP

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

838-11AL: Clamp Assembly



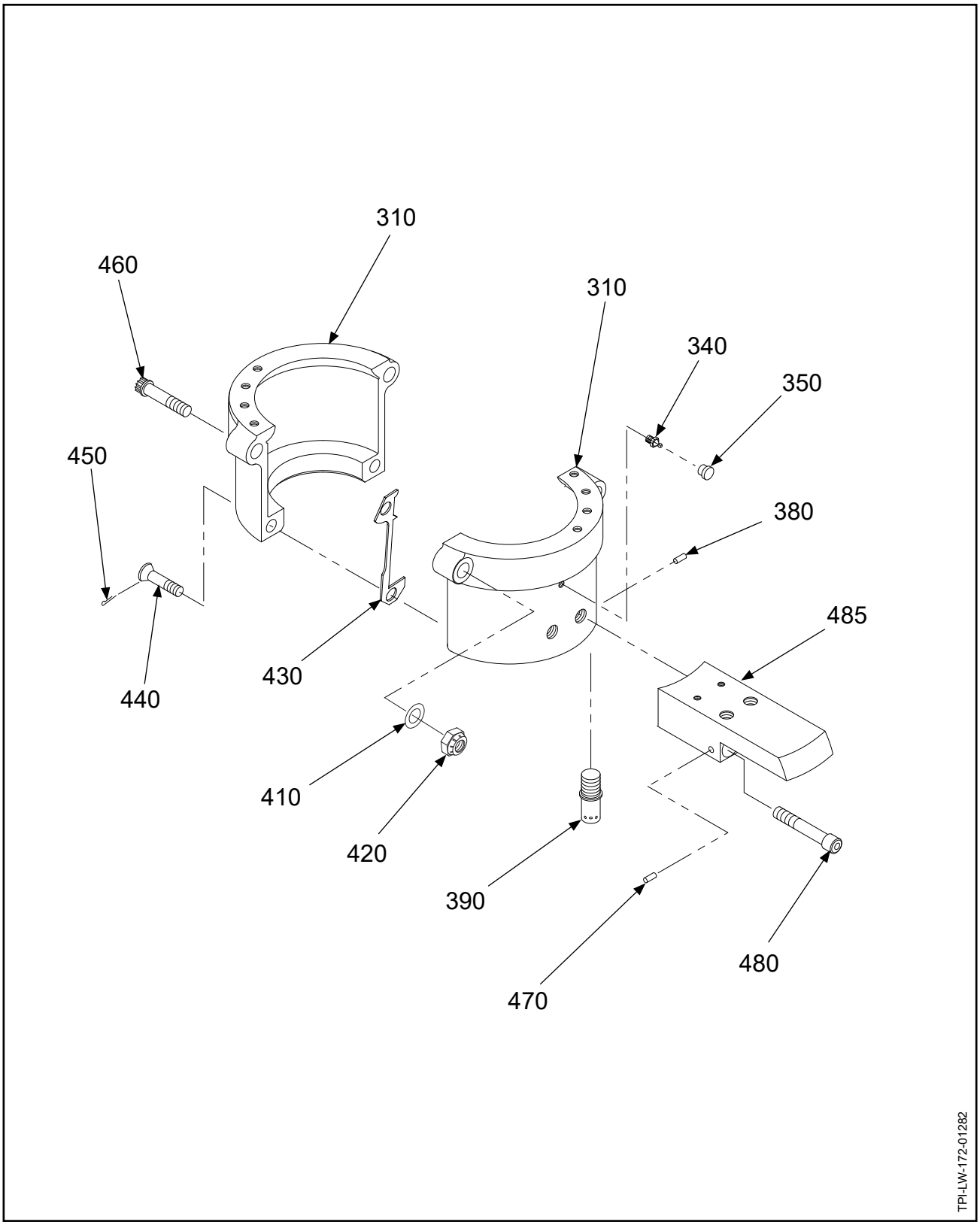
838-18: Clamp Assembly
Figure 10A-12

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-12		**838-18: CLAMP ASSEMBLY PARTS**				
300	838-18	CLAMP ASSEMBLY "V" SERIES"		1		
310	C-3-5AL	• BLADE CLAMP		1		
340	B-6588-1	• FITTING, LUBRICATION		2	Y	
350	B-6544	• CAP, FITTING, LUBRICATION		2	Y	
-370	A-65	• DOWEL PIN, 1/4, REPLACED BY ITEM 375		1	Y	
-375	101375	• PLUG, PULL, REPLACES ITEM 370 POST HC-SB-61-285		AR	Y	
380	A-285	• SPRING PIN, 3/32", CRES		1	Y	
390	A-304	• LINKSCREW, 1/2-20		1	Y	
-410	A-2031	• WASHER, 3/8"		2	Y	
420	A-2043-1	• NUT, 3/8-24, HEX, SELF-LOCKING		2	Y	
430	A-47-1	• GASKET, CLAMP		2	Y	
440	A-321	• SCREW, 3/8-24 DOUBLE 60° HEAD, INBOARD CLAMP		2	Y	
450	B-3838-3-2	• COTTER PIN		2	Y	
460	A-2017	• BOLT, 3/8-24, 12 POINT, OUTBOARD CLAMP		2	Y	
470	A-285	• SPRING PIN, 3/32", CRES		2	Y	
470A	B-3838-3-2	• COTTER PIN - ALTERNATE FOR ITEM 470		2	Y	
480	A-2036-30	• SCREW, 7/16-20, CAP, MODIFIED, COUNTERWEIGHT REPLACED BY ITEM 480A		2	Y	
480A	107995-30	• BOLT, 7/16-20, 12 POINT, REPLACES ITEM 480 (COUNTERWEIGHT)		2	Y	
485	833-4	• PCP: COUNTERWEIGHT UNIT		1		PCP

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

838-18: Clamp Assembly



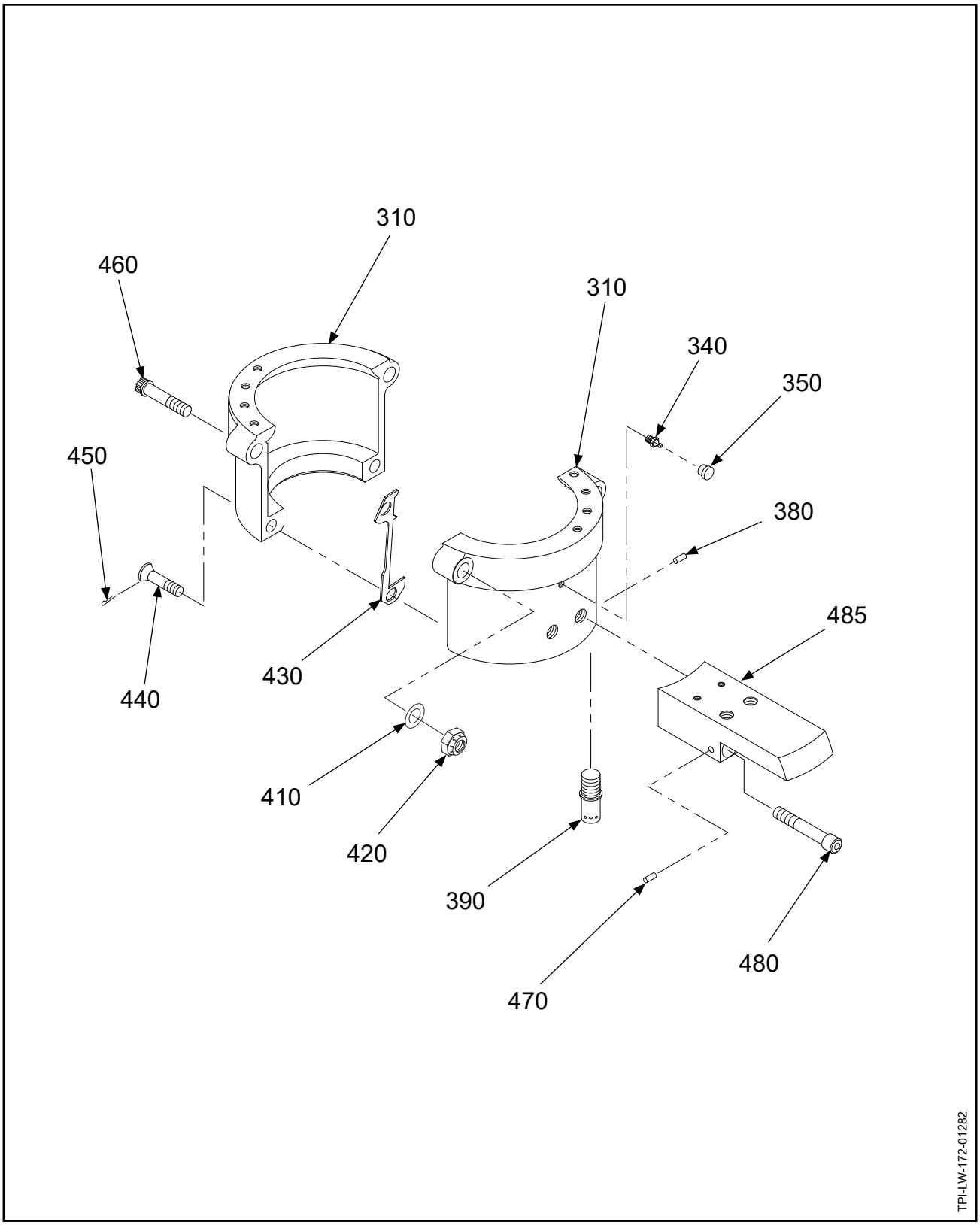
838-23: Clamp Assembly
Figure 10A-13

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-13		**838-23: CLAMP ASSEMBLY PARTS**				
300	838-23	CLAMP ASSEMBLY "V" SERIES"		1		
310	C-3-5A	• BLADE CLAMP		1		
340	B-6588-1	• FITTING, LUBRICATION		2	Y	
350	B-6544	• CAP, FITTING, LUBRICATION		2	Y	
-370	A-65	• DOWEL PIN, 1/4, REPLACED BY ITEM 375		1	Y	
-375	101375	• PLUG, PULL, REPLACES ITEM 370 POST HC-SB-61-285		AR	Y	
380	A-285	• SPRING PIN, 3/32", CRES		1	Y	
390	A-304	• LINKSCREW, 1/2-20		1	Y	
-410	A-2031	• WASHER, 3/8"		2	Y	
420	A-2043-1	• NUT, 3/8-24, HEX, SELF-LOCKING		2	Y	
430	A-47-1	• GASKET, CLAMP		2	Y	
440	A-321	• SCREW, 3/8-24 DOUBLE 60° HEAD, INBOARD CLAMP		2	Y	
450	B-3838-3-2	• COTTER PIN		2	Y	
460	A-2017	• BOLT, 3/8-24, 12 POINT, OUTBOARD CLAMP		2	Y	
470	A-285	• SPRING PIN, 3/32", CRES		2	Y	
470A	B-3838-3-2	• COTTER PIN - ALTERNATE FOR ITEM 470		2	Y	
480	A-2036-30	• SCREW, 7/16-20, CAP, MODIFIED, COUNTERWEIGHT REPLACED BY ITEM 480A		2	Y	
480A	107995-30	• BOLT, 7/16-20, 12 POINT, REPLACES ITEM 480 (COUNTERWEIGHT)		2	Y	
485A	833-4R	• PCP: COUNTERWEIGHT UNIT		1		PCP

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

838-23: Clamp Assembly



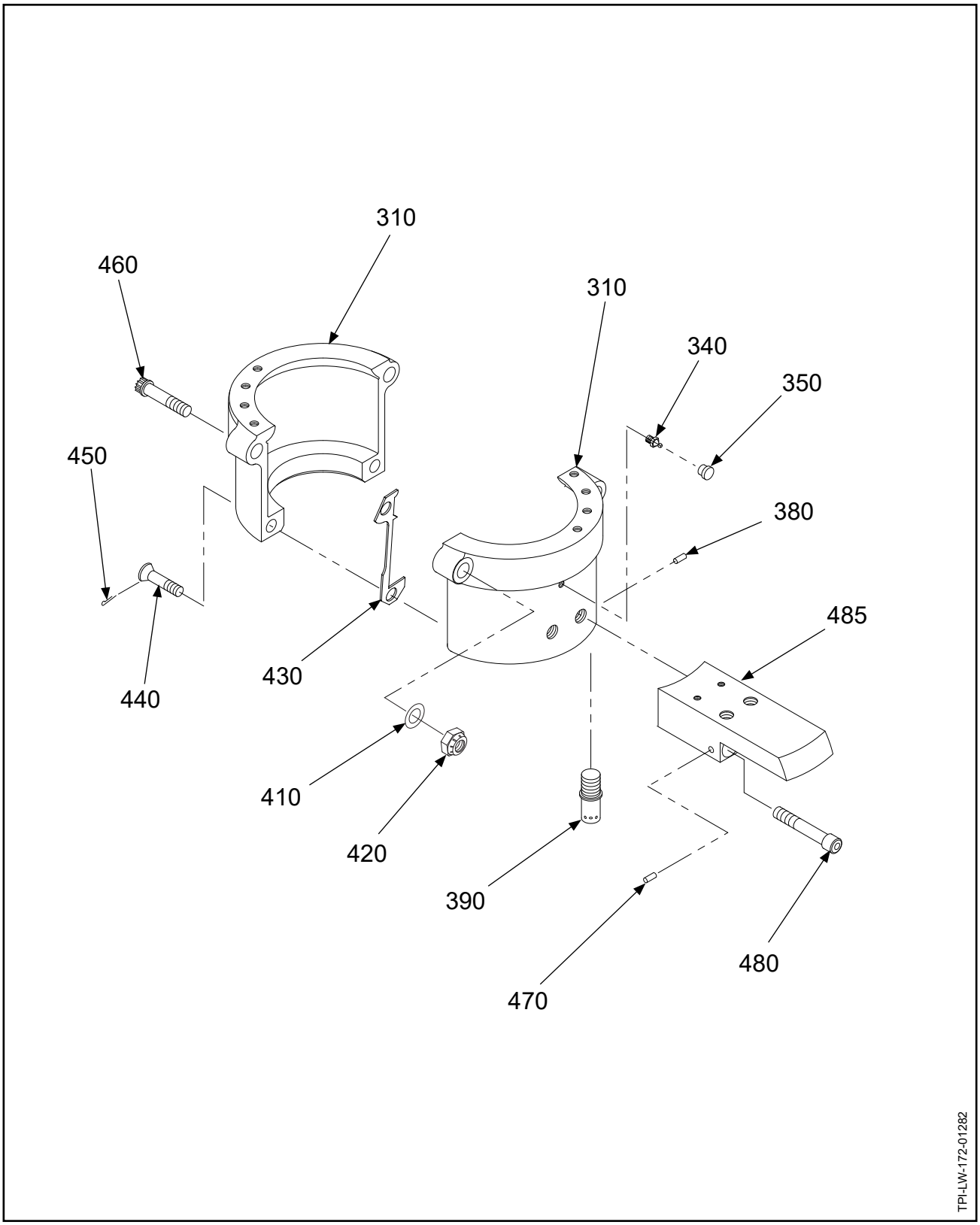
838-23L: Clamp Assembly
Figure 10A-14

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-14		**838-23L: CLAMP ASSEMBLY PARTS**				
300	838-23L	CLAMP ASSEMBLY "V" SERIES"		1		
310	C-3-5AL	• BLADE CLAMP		1		
340	B-6588-1	• FITTING, LUBRICATION		2	Y	
350	B-6544	• CAP, FITTING, LUBRICATION		2	Y	
-370	A-65	• DOWEL PIN, 1/4, REPLACED BY ITEM 375		1	Y	
-375	101375	• PLUG, PULL, REPLACES ITEM 370 POST HC-SB-61-285		AR	Y	
380	A-285	• SPRING PIN, 3/32", CRES		1	Y	
390	A-304	• LINKSCREW, 1/2-20		1	Y	
-410	A-2031	• WASHER, 3/8"		2	Y	
420	A-2043-1	• NUT, 3/8-24, HEX, SELF-LOCKING		2	Y	
430	A-47-1	• GASKET, CLAMP		2	Y	
440	A-321	• SCREW, 3/8-24 DOUBLE 60° HEAD, INBOARD CLAMP		2	Y	
450	B-3838-3-2	• COTTER PIN		2	Y	
460	A-2017	• BOLT, 3/8-24, 12 POINT, OUTBOARD CLAMP		2	Y	
470	A-285	• SPRING PIN, 3/32", CRES		2	Y	
470A	B-3838-3-2	• COTTER PIN - ALTERNATE FOR ITEM 470		2	Y	
480	A-2036-30	• SCREW, 7/16-20, CAP, MODIFIED, COUNTERWEIGHT REPLACED BY ITEM 480A		2	Y	
480A	107995-30	• BOLT, 7/16-20, 12 POINT, REPLACES ITEM 480 (COUNTERWEIGHT)		2	Y	
485A	833-4L	• PCP: COUNTERWEIGHT UNIT		1		PCP

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

838-23L: Clamp Assembly



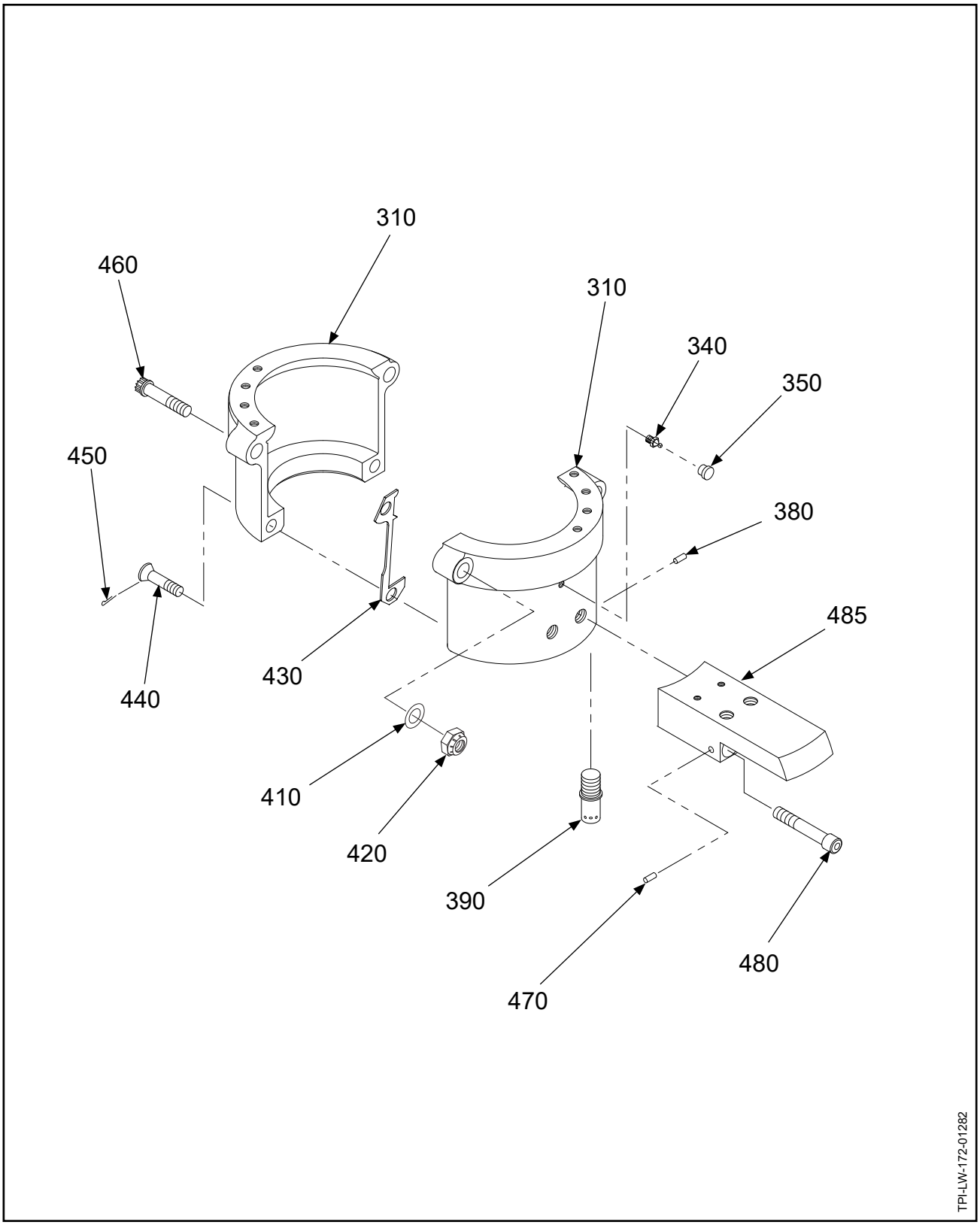
838-52: Clamp Assembly
Figure 10A-15

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-15		**838-52: CLAMP ASSEMBLY PARTS**				
300	838-52	CLAMP ASSEMBLY "V" SERIES"		1		
310	C-3-5AL	• BLADE CLAMP		1		
340	B-6588-1	• FITTING, LUBRICATION		2	Y	
350	B-6544	• CAP, FITTING, LUBRICATION		2	Y	
-370	A-65	• DOWEL PIN, 1/4, REPLACED BY ITEM 375		1	Y	
-375	101375	• PLUG, PULL, REPLACES ITEM 370 POST HC-SB-61-285		AR	Y	
380	A-285	• SPRING PIN, 3/32", CRES		1	Y	
390	A-304	• LINKSCREW, 1/2-20		1	Y	
-410	A-2031	• WASHER, 3/8"		2	Y	
420	A-2043-1	• NUT, 3/8-24, HEX, SELF-LOCKING		2	Y	
430	A-47-1	• GASKET, CLAMP		2	Y	
440	A-321	• SCREW, 3/8-24 DOUBLE 60° HEAD, INBOARD CLAMP		2	Y	
450	B-3838-3-2	• COTTER PIN		2	Y	
460	A-2017	• BOLT, 3/8-24, 12 POINT, OUTBOARD CLAMP		2	Y	
470	A-285	• SPRING PIN, 3/32", CRES		2	Y	
470A	B-3838-3-2	• COTTER PIN - ALTERNATE FOR ITEM 470		2	Y	
480	A-2036-32	• •SCREW, 7/16-20, CAP, MODIFIED, COUNTERWEIGHT REPLACED BY ITEM 480A		2	Y	
480A	107995-32	• •BOLT, 7/16-20, 12 POINT, REPLACES ITEM 480 (COUNTERWEIGHT)		2	Y	
485A	833-26	• PCP: COUNTERWEIGHT UNIT		1		PCP

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

838-52: Clamp Assembly



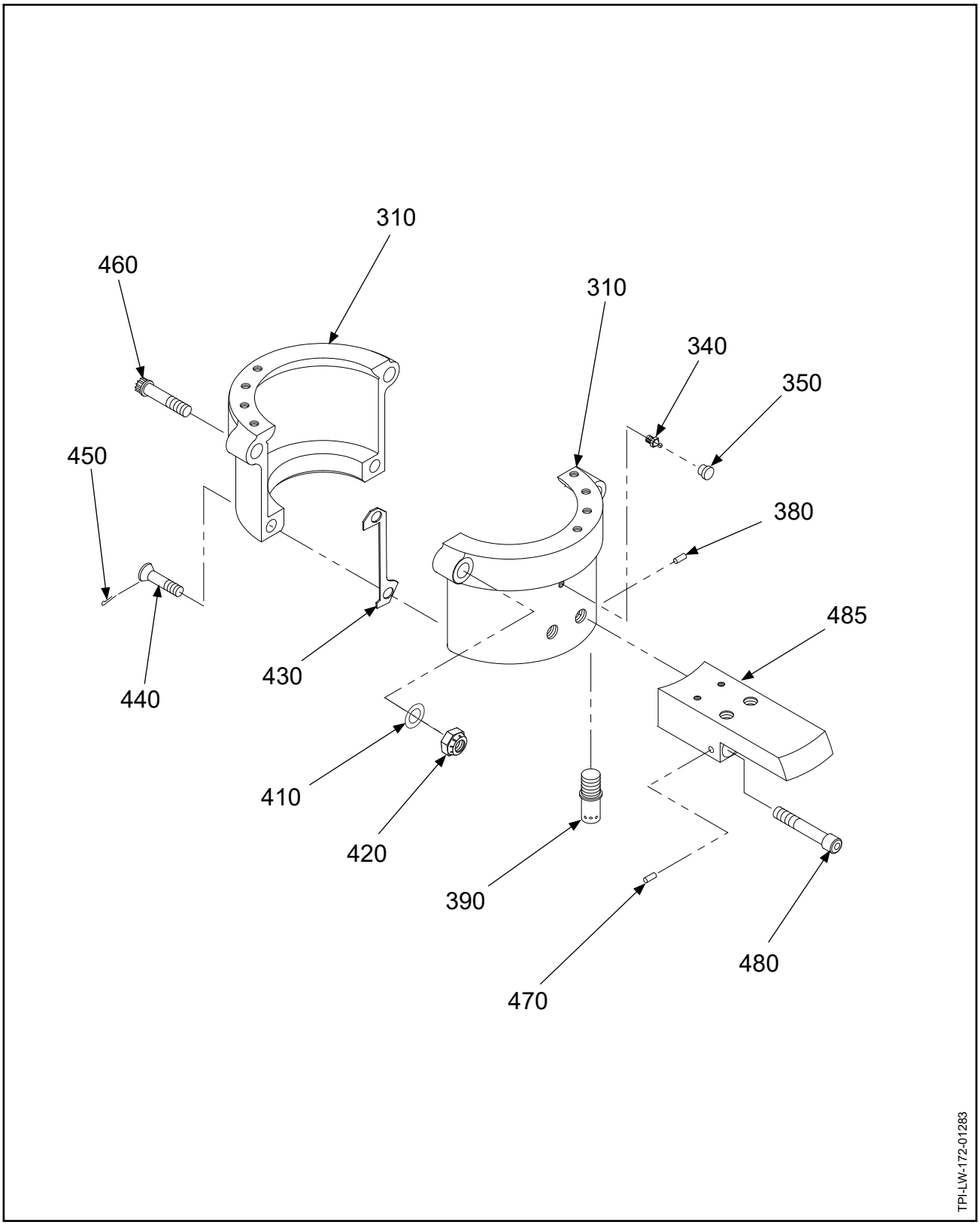
838-60: Clamp Assembly
Figure 10A-16

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-16		**838-60: CLAMP ASSEMBLY PARTS**				
-300	838-6	CLAMP ASSEMBLY "V" SERIES		1		
310	C-3-5A	• BLADE CLAMP		1		
340	B-6588-1	• FITTING, LUBRICATION		2	Y	
350	B-6544	• CAP, FITTING, LUBRICATION		2	Y	
-370	A-65	• DOWEL PIN, 1/4, REPLACED BY ITEM 375		1	Y	
-375	101375	• PLUG, PULL, REPLACES ITEM 370 POST HC-SB-61-285		AR	Y	
380	A-285	• SPRING PIN, 3/32", CRES		1	Y	
390	A-304	• LINKSCREW, 1/2-20		1	Y	
410	A-2031	• WASHER, 3/8" - USED WITH ITEM 420		2	Y	
420	A-2043-1	• NUT, 3/8-24, HEX, SELF-LOCKING		2	Y	
430	A-47-1	• GASKET, CLAMP		2	Y	
440	A-321	• SCREW, 3/8-24 DOUBLE 60° HEAD, INBOARD CLAMP		2	Y	
450	B-3838-3-2	• COTTER PIN		2	Y	
460	A-2017	• BOLT, 3/8-24, 12 POINT, OUTBOARD CLAMP		2	Y	
470	A-285	• SPRING PIN, 3/32", CRES		2	Y	
470A	B-3838-3-2	• COTTER PIN - ALTERNATE FOR ITEM 470		2	Y	
480	A-2036-30	• SCREW, 7/16-20, CAP, MODIFIED, COUNTERWEIGHT REPLACED BY ITEM 480A		2	Y	
480A	107995-30	• BOLT, 7/16-20, 12 POINT, REPLACES ITEM 480 (COUNTERWEIGHT)		2	Y	
485	833-4	• PCP: COUNTERWEIGHT UNIT		1		PCP

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

838-60: Clamp Assembly



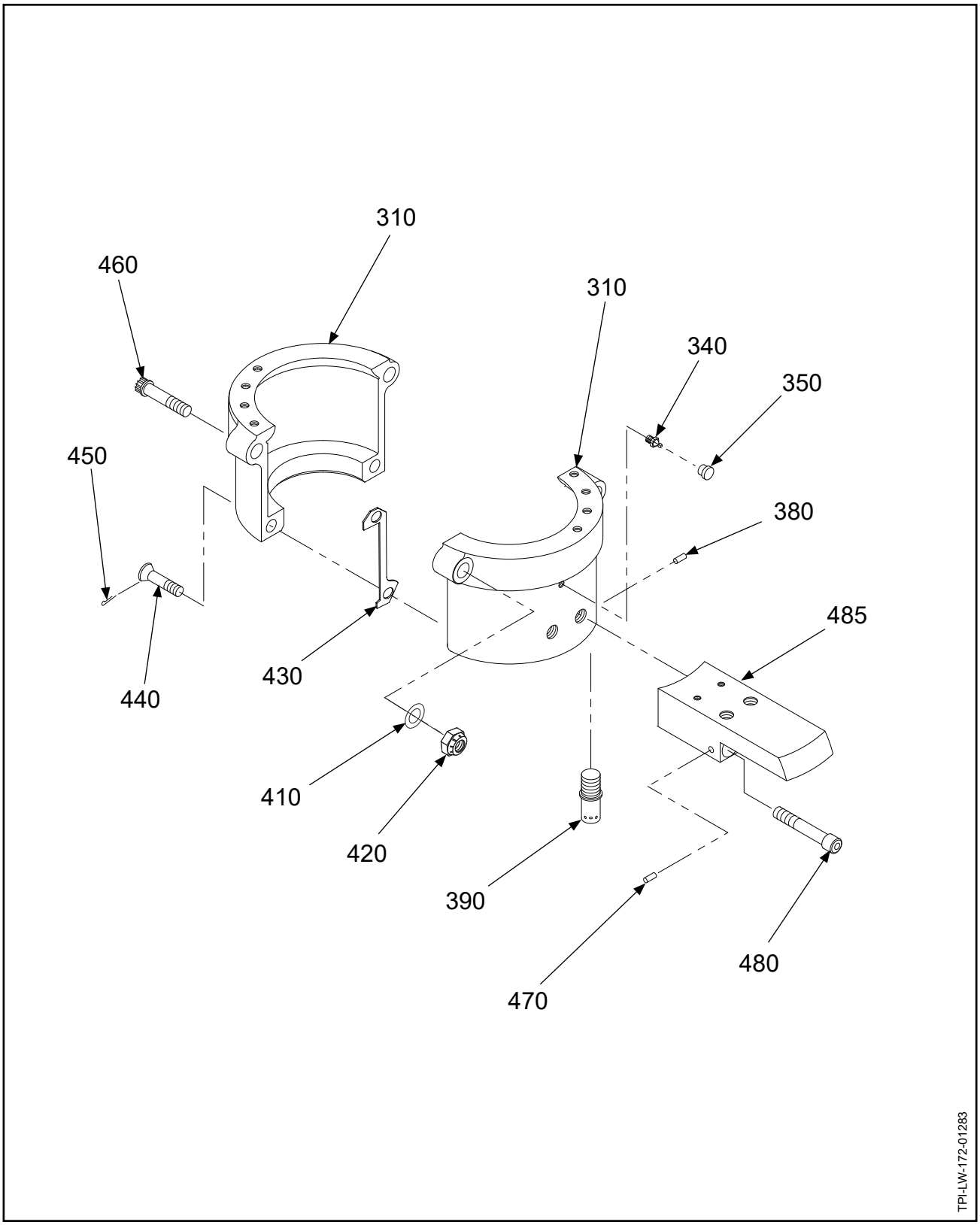
838-1006: Clamp Assembly
Figure 10A-17

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A17		**838-1006: CLAMP ASSEMBLY PARTS**				
-300	838-1006	PCP: CLAMP ASSEMBLY "MV" SERIES		1		PCP
310	D-6831-5A	• PCP: CLAMP, BLADE, "MV" SHANK		1		PCP
340	B-6588-1	• FITTING, LUBRICATION		2	Y	
350	B-6544	• CAP, FITTING, LUBRICATION		2	Y	
-370	A-65	• DOWEL PIN, 1/4, REPLACED BY ITEM 375		1	Y	
-375	101375	• PLUG, PULL, REPLACES ITEM 370 POST HC-SB-61-285		AR	Y	
380	A-285	• SPRING PIN, 3/32", CRES		1	Y	
390	A-304	• LINKSCREW, 1/2-20		1	Y	
410	A-2031	• WASHER, 3/8" - USED WITH ITEM 420		2	Y	
420	A-2043-1	• NUT, 3/8-24, HEX, SELF-LOCKING		2	Y	
430	A-6871-1	• CLAMP GASKET		2	Y	
440	A-321	• SCREW, 3/8-24 DOUBLE 60° HEAD, INBOARD CLAMP		2	Y	
450	B-3838-3-2	• COTTER PIN		2	Y	
460	A-2017	• BOLT, 3/8-24, 12 POINT, OUTBOARD CLAMP		2	Y	
470	A-285	• SPRING PIN, 3/32", CRES		2	Y	
470A	B-3838-3-2	• COTTER PIN - ALTERNATE FOR ITEM 470		2	Y	
480	A-2036-30	• SCREW, 7/16-20, CAP, MODIFIED, COUNTERWEIGHT REPLACED BY ITEM 480A		2	Y	
480A	107995-30	• BOLT, 7/16-20, 12 POINT, REPLACES ITEM 480 (COUNTERWEIGHT)		2	Y	
485	833-4	• PCP: COUNTERWEIGHT UNIT		1		PCP

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

838-1006: Clamp Assembly



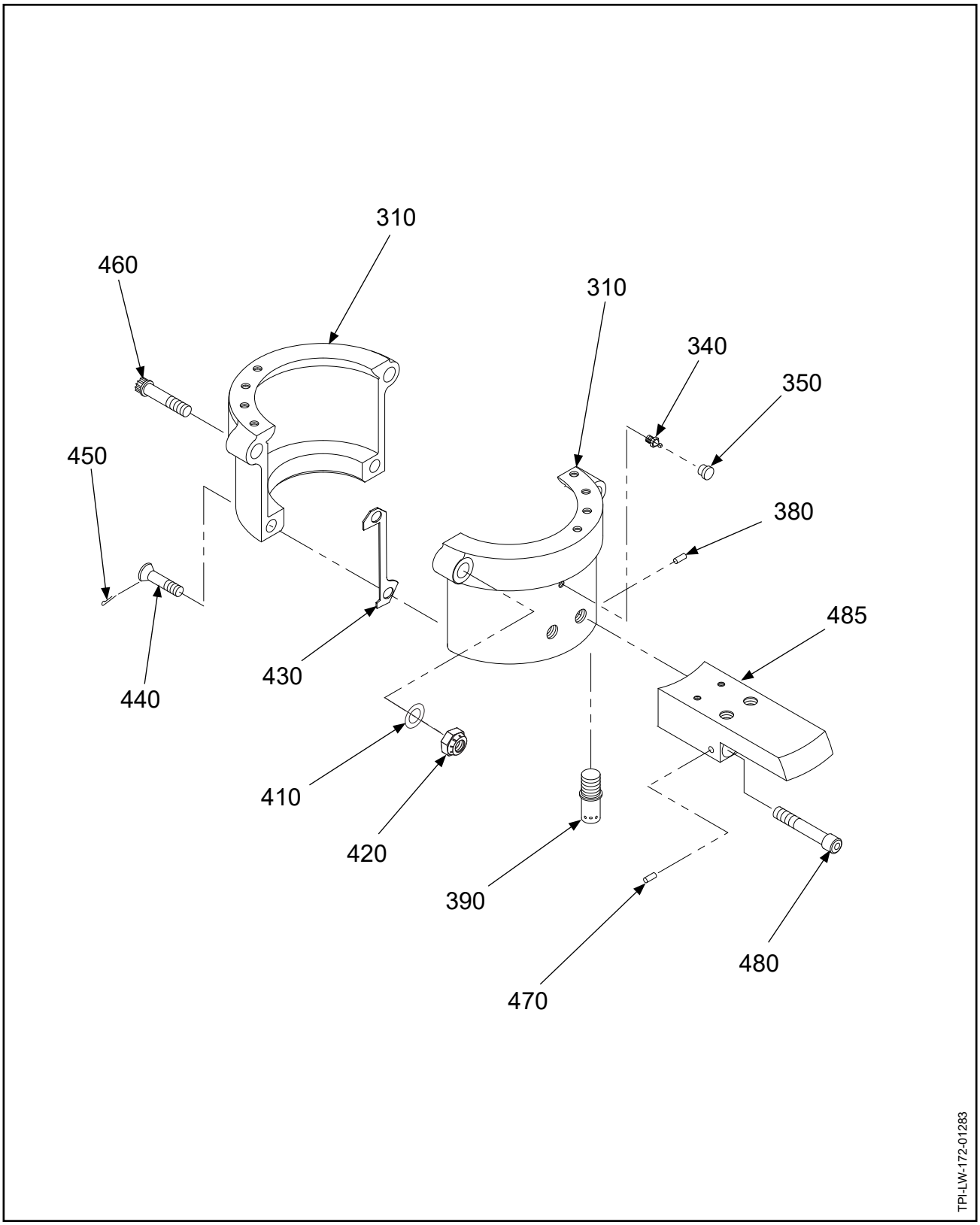
838-1010: Clamp Assembly
Figure 10A-18

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-18		**838-1010: CLAMP ASSEMBLY PARTS**				
300	838-1010	PCP: CLAMP ASSEMBLY "MV" SERIES		1		PCP
310	D-6831-5A	• PCP: CLAMP, BLADE, "MV" SHANK		1		PCP
340	B-6588-1	• FITTING, LUBRICATION		2	Y	
350	B-6544	• CAP, FITTING, LUBRICATION		2	Y	
-370	A-65	• DOWEL PIN, 1/4, REPLACED BY ITEM 375		1	Y	
-375	101375	• PLUG, PULL, REPLACES ITEM 370 POST HC-SB-61-285		AR	Y	
380	A-285	• SPRING PIN, 3/32", CRES		1	Y	
390	A-304	• LINKSCREW, 1/2-20		1	Y	
410	A-2031	• WASHER, 3/8" - USED WITH ITEM 420		2	Y	
420	A-2043-1	• NUT, 3/8-24, HEX, SELF-LOCKING		2	Y	
430	A-6871-1	• GASKET, CLAMP		2	Y	
440	A-321	• SCREW, 3/8-24 DOUBLE 60° HEAD, INBOARD CLAMP		2	Y	
450	B-3838-3-2	• COTTER PIN		2	Y	
460	A-2017	• BOLT, 3/8-24, 12 POINT, OUTBOARD CLAMP		2	Y	
470	A-285	• SPRING PIN, 3/32", CRES		2	Y	
470A	B-3838-3-2	• COTTER PIN - ALTERNATE FOR ITEM 470		2	Y	
480	A-2036-30	• SCREW, 7/16-20, CAP, MODIFIED, COUNTERWEIGHT REPLACED BY ITEM 480A		2	Y	
480A	107995-30	• BOLT, 7/16-20, 12 POINT, REPLACES ITEM 480 (COUNTERWEIGHT)		2	Y	
485	833-2	• PCP:COUNTERWEIGHT UNIT		1		PCP

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

838-1010: Clamp Assembly



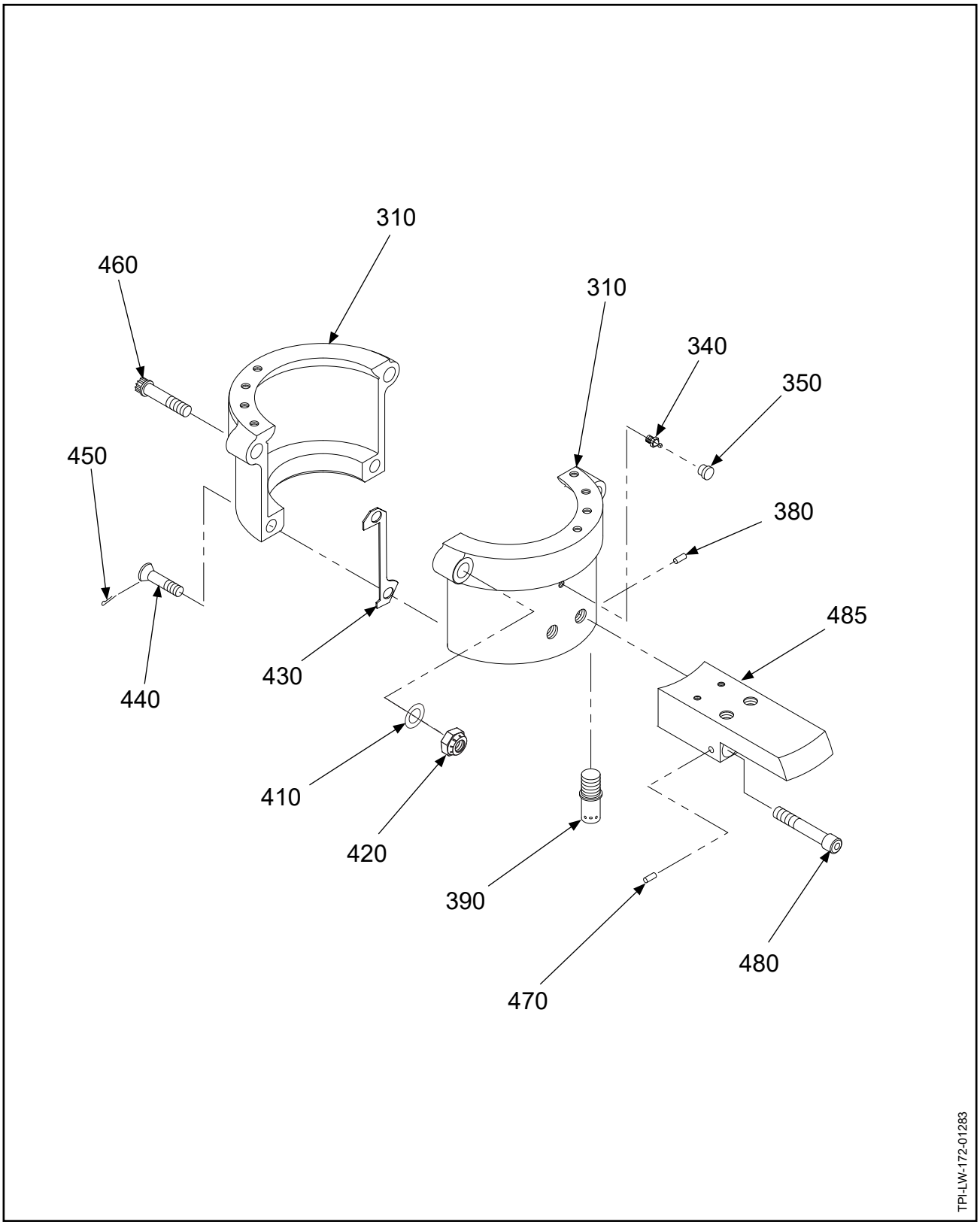
838-1011: Clamp Assembly
Figure 10A-19

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-19		**838-1011: CLAMP ASSEMBLY PARTS**				
300	838-1011	PCP: CLAMP ASSEMBLY "MV" SERIES		1		PCP
310	D-6831-5A	• PCP: CLAMP, BLADE, "MV" SHANK		1		PCP
340	B-6588-1	• FITTING, LUBRICATION		2	Y	
350	B-6544	• CAP, FITTING, LUBRICATION		2	Y	
-370	A-65	• DOWEL PIN, 1/4, REPLACED BY ITEM 375		1	Y	
-375	101375	• PLUG, PULL, REPLACES ITEM 370 POST HC-SB-61-285		AR	Y	
380	A-285	• SPRING PIN, 3/32", CRES		1	Y	
390	A-304	• LINKSCREW, 1/2-20		1	Y	
410	A-2031	• WASHER, 3/8" - USED WITH ITEM 420		2	Y	
420	A-2043-1	• NUT, 3/8-24, HEX, SELF-LOCKING		2	Y	
430	A-6871-1	• GASKET, CLAMP		2	Y	
440	A-321	• SCREW, 3/8-24 DOUBLE 60° HEAD, INBOARD CLAMP		2	Y	
450	B-3838-3-2	• COTTER PIN		2	Y	
460	A-2017	• BOLT, 3/8-24, 12 POINT, OUTBOARD CLAMP		2	Y	
470	A-285	• SPRING PIN, 3/32", CRES		2	Y	
470A	B-3838-3-2	• COTTER PIN - ALTERNATE FOR ITEM 470		2	Y	
480	A-2036-30	• SCREW, 7/16-20, CAP, MODIFIED, COUNTERWEIGHT REPLACED BY ITEM 480A		2	Y	
480A	107995-30	• BOLT, 7/16-20, 12 POINT, REPLACES ITEM 480 (COUNTERWEIGHT)		2	Y	
485	B-271-1	• PCP: COUNTERWEIGHT		1		PCP

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

838-1011: Clamp Assembly



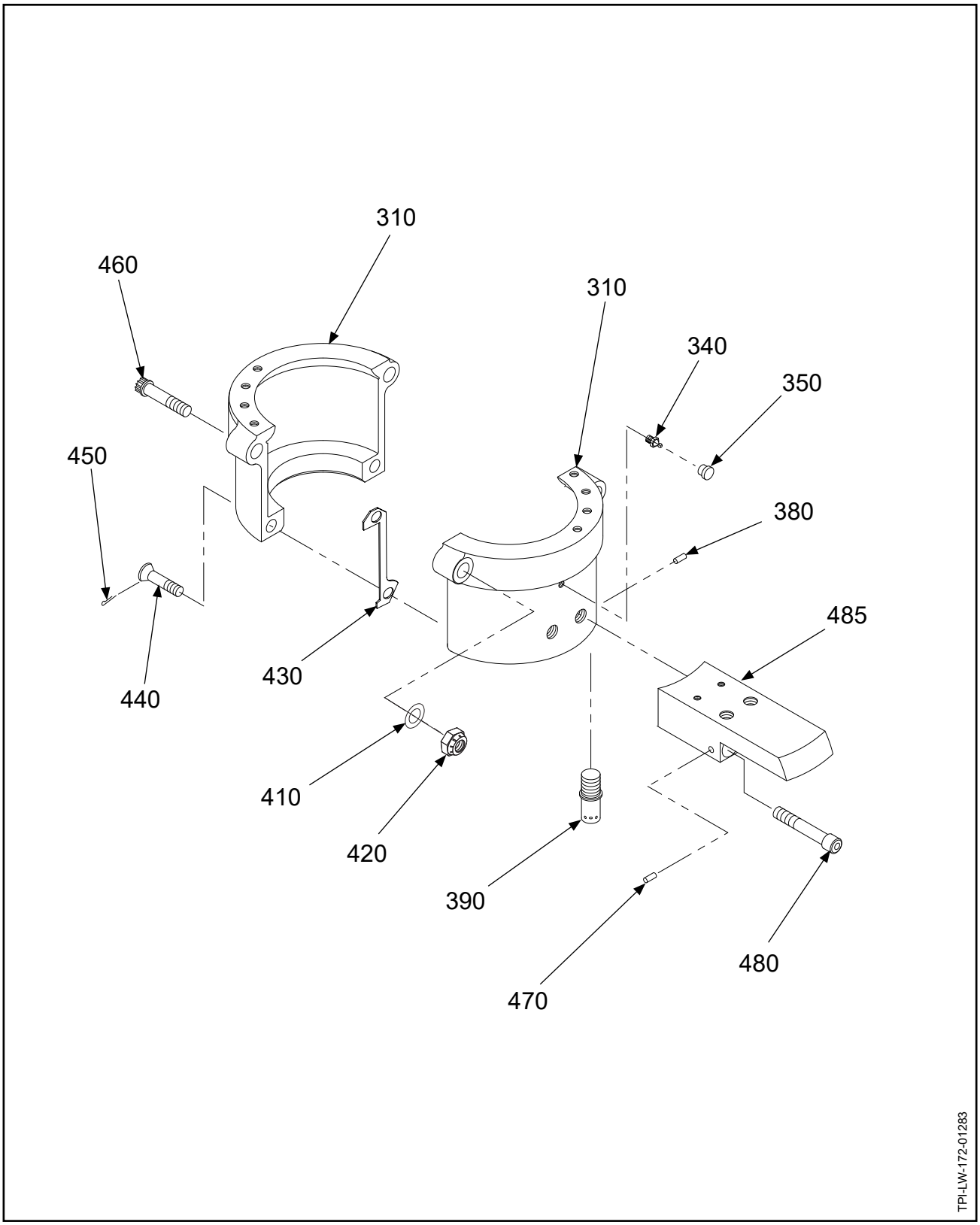
838-1011A: Clamp Assembly
Figure 10A-20

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-20		**838-1011A: CLAMP ASSEMBLY PARTS**				
300	838-1011A	PCP: CLAMP ASSEMBLY		1		PCP
310	D-6831-5A	• PCP: CLAMP, BLADE, "MV" SHANK		1		PCP
340	B-6588-1	• FITTING, LUBRICATION		2	Y	
350	B-6544	• CAP, FITTING, LUBRICATION		2	Y	
-370	A-65	• DOWEL PIN, 1/4, REPLACED BY ITEM 375		1	Y	
-375	101375	• PLUG, PULL, REPLACES ITEM 370 POST HC-SB-61-285		AR	Y	
380	A-285	• SPRING PIN, 3/32", CRES		1		
390	A-304	• LINKSCREW, 1/2-20		1	Y	
410	A-2031	• WASHER, 3/8" - USED WITH ITEM 420		2	Y	
420	A-2043-1	• NUT, 3/8-24, HEX, SELF-LOCKING		2	Y	
430	A-6871-1	• CLAMP GASKET		2	Y	
440	A-321	• SCREW, 3/8-24 DOUBLE 60° HEAD, INBOARD CLAMP		2	Y	
450	B-3838-3-2	• COTTER PIN		2	Y	
460	A-2017	• BOLT, 3/8-24, 12 POINT, OUTBOARD CLAMP		2	Y	
470	A-285	• SPRING PIN, 3/32", CRES		2	Y	
470A	B-3838-3-2	• COTTER PIN - ALTERNATE FOR ITEM 470		2	Y	
480	A-2036-30	• SCREW, 7/16-20, CAP, MODIFIED, COUNTERWEIGHT REPLACED BY ITEM 480A		2	Y	
480A	107995-30	• BOLT, 7/16-20, 12 POINT, REPLACES ITEM 480 (COUNTERWEIGHT)		2	Y	
485	B-271-1A	• PCP: COUNTERWEIGHT		1		PCP

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

838-1011A: Clamp Assembly



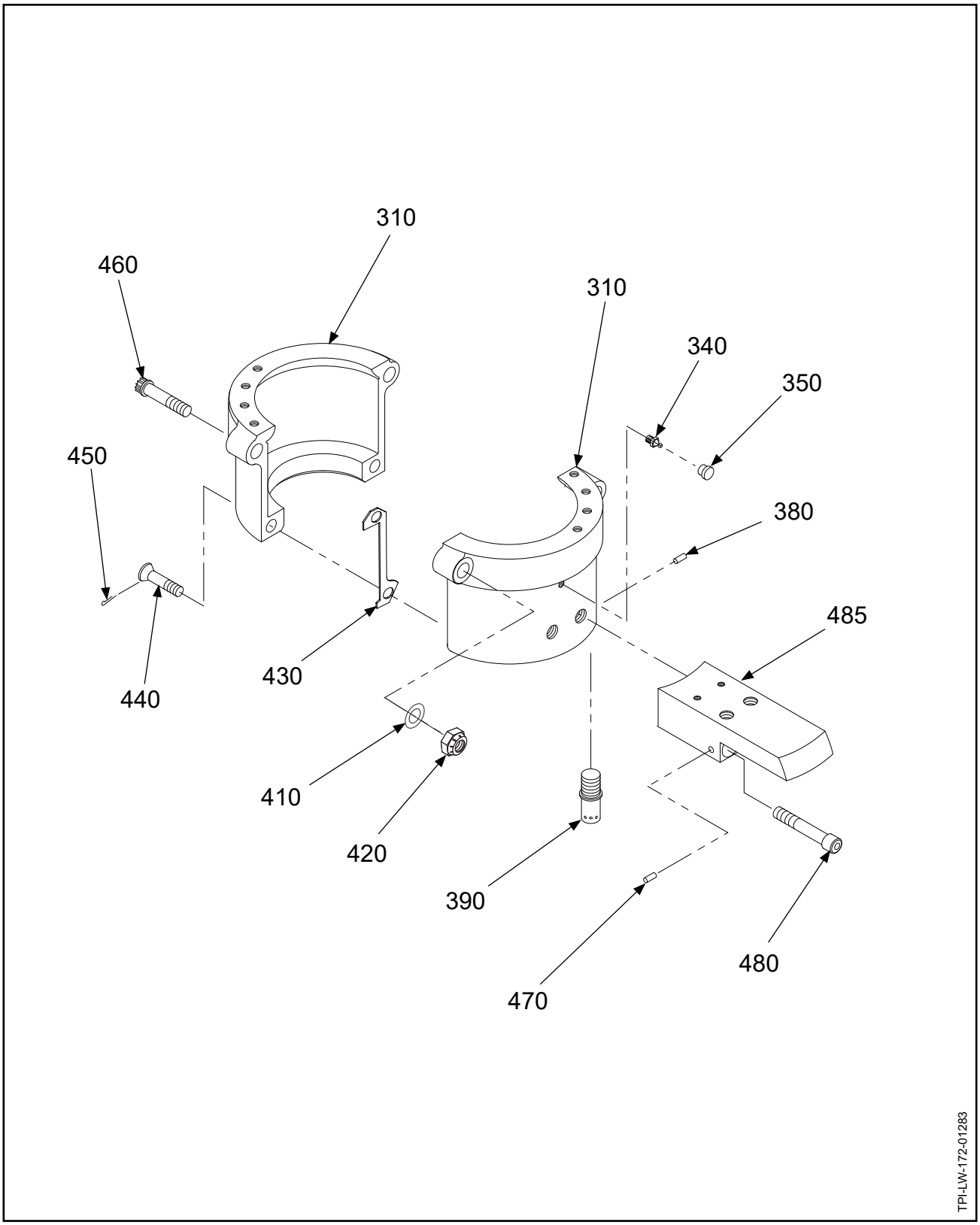
838-1011AL: Clamp Assembly
Figure 10A-21

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-21		**838-1011AL: CLAMP ASSEMBLY PARTS**				
300	838-1011AL	PCP: CLAMP ASSEMBLY		1		PCP
310	D-6831-5AL	• PCP: CLAMP, BLADE, "MV" SHANK		1		PCP
340	B-6588-1	• FITTING, LUBRICATION		2	Y	
350	B-6544	• CAP, FITTING, LUBRICATION		2	Y	
-370	A-65	• DOWEL PIN, 1/4, REPLACED BY ITEM 375		1	Y	
-375	101375	• PLUG, PULL, REPLACES ITEM 370 POST HC-SB-61-285		AR	Y	
380	A-285	• SPRING PIN, 3/32", CRES		1		
390	A-304	• LINKSCREW, 1/2-20		1	Y	
410	A-2031	• WASHER, 3/8" - USED WITH ITEM 420		2	Y	
420	A-2043-1	• NUT, 3/8-24, HEX, SELF-LOCKING		2	Y	
430	A-6871-1	• CLAMP GASKET		2	Y	
440	A-321	• SCREW, 3/8-24 DOUBLE 60° HEAD, INBOARD CLAMP		2	Y	
450	B-3838-3-2	• COTTER PIN		2	Y	
460	A-2017	• BOLT, 3/8-24, 12 POINT, OUTBOARD CLAMP		2	Y	
470	A-285	• SPRING PIN, 3/32", CRES		2	Y	
470A	B-3838-3-2	• COTTER PIN - ALTERNATE FOR ITEM 470		2	Y	
480	A-2036-30	• SCREW, 7/16-20, CAP, MODIFIED, COUNTERWEIGHT REPLACED BY ITEM 480A		2	Y	
480A	107995-30	• BOLT, 7/16-20, 12 POINT, REPLACES ITEM 480 (COUNTERWEIGHT)		2	Y	
485	B-271-1A	• PCP: COUNTERWEIGHT		1		PCP

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

838-1011AL: Clamp Assembly



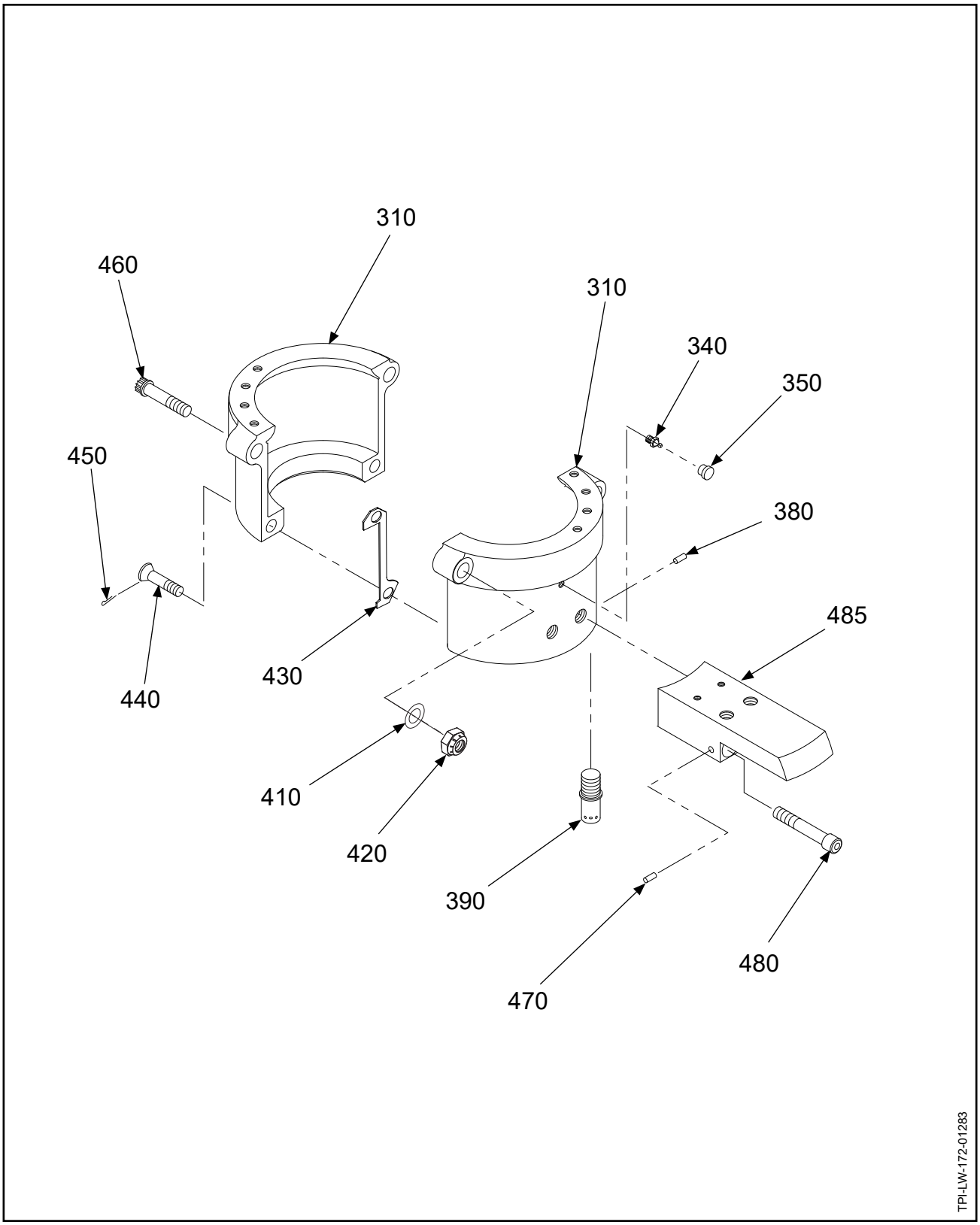
838-1018: Clamp Assembly
Figure 10A-22

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-22		**838-1018: CLAMP ASSEMBLY PARTS**				
300	838-1018	PCP: CLAMP ASSEMBLY		1		PCP
310	D-6831-5AL	• PCP: CLAMP, BLADE, "MV" SHANK		1		PCP
340	B-6588-1	• FITTING, LUBRICATION		2	Y	
350	B-6544	• CAP, FITTING, LUBRICATION		2	Y	
-370	A-65	• DOWEL PIN, 1/4, REPLACED BY ITEM 375		1	Y	
-375	101375	• PLUG, PULL, REPLACES ITEM 370 POST HC-SB-61-285		AR	Y	
380	A-285	• SPRING PIN, 3/32", CRES		1		
390	A-304	• LINKSCREW, 1/2-20		1	Y	
410	A-2031	• WASHER, 3/8" - USED WITH ITEM 420		2	Y	
420	A-2043-1	• NUT, 3/8-24, HEX, SELF-LOCKING		2	Y	
430	A-6871-1	• CLAMP GASKET		2	Y	
440	A-321	• SCREW, 3/8-24 DOUBLE 60° HEAD, INBOARD CLAMP		2	Y	
450	B-3838-3-2	• COTTER PIN		2	Y	
460	A-2017	• BOLT, 3/8-24, 12 POINT, OUTBOARD CLAMP		2	Y	
470	A-285	• SPRING PIN, 3/32", CRES		2	Y	
470A	B-3838-3-2	• COTTER PIN - ALTERNATE FOR ITEM 470		2	Y	
480	A-2036-30	• SCREW, 7/16-20, CAP, MODIFIED, COUNTERWEIGHT REPLACED BY ITEM 480A		2	Y	
480A	107995-30	• BOLT, 7/16-20, 12 POINT, REPLACES ITEM 480 (COUNTERWEIGHT)		2	Y	
485	833-4	• PCP: COUNTERWEIGHT UNIT		1		PCP

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

838-1018: Clamp Assembly



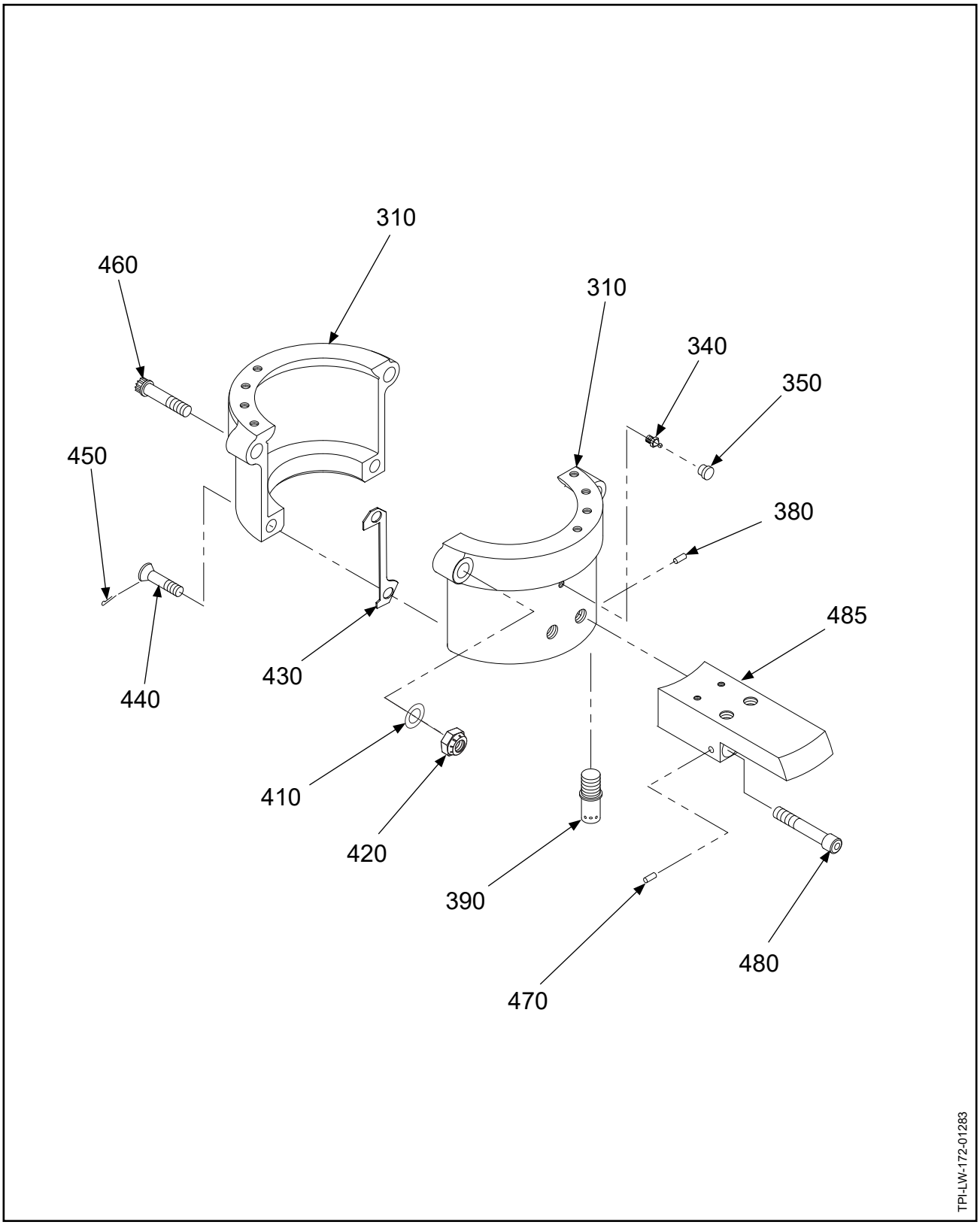
838-1023: Clamp Assembly
Figure 10A-23

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-23		**838-1023: CLAMP ASSEMBLY PARTS**				
300	838-1023	PCP: CLAMP ASSEMBLY		1		PCP
310	D-6831-5A	• PCP: CLAMP, BLADE, "MV" SHANK		1		PCP
340	B-6588-1	• FITTING, LUBRICATION		2	Y	
350	B-6544	• CAP, FITTING, LUBRICATION		2	Y	
-370	A-65	• DOWEL PIN, 1/4, REPLACED BY ITEM 375		1	Y	
-375	101375	• PLUG, PULL, REPLACES ITEM 370 POST HC-SB-61-285		AR	Y	
380	A-285	• SPRING PIN, 3/32", CRES		1		
390	A-304	• LINKSCREW, 1/2-20		1	Y	
410	A-2031	• WASHER, 3/8" - USED WITH ITEM 420		2	Y	
420	A-2043-1	• NUT, 3/8-24, HEX, SELF-LOCKING		2	Y	
430	A-6871-1	• CLAMP GASKET		2	Y	
440	A-321	• SCREW, 3/8-24 DOUBLE 60° HEAD, INBOARD CLAMP		2	Y	
450	B-3838-3-2	• COTTER PIN		2	Y	
460	A-2017	• BOLT, 3/8-24, 12 POINT, OUTBOARD CLAMP		2	Y	
470	A-285	• SPRING PIN, 3/32", CRES		2	Y	
470A	B-3838-3-2	• COTTER PIN - ALTERNATE FOR ITEM 470		2	Y	
480	A-2036-30	• SCREW, 7/16-20, CAP, MODIFIED, COUNTERWEIGHT REPLACED BY ITEM 480A		2	Y	
480A	107995-30	• BOLT, 7/16-20, 12 POINT, REPLACES ITEM 480 (COUNTERWEIGHT)		2	Y	
485	833-4R	• PCP: COUNTERWEIGHT UNIT		1		PCP

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

838-1023: Clamp Assembly



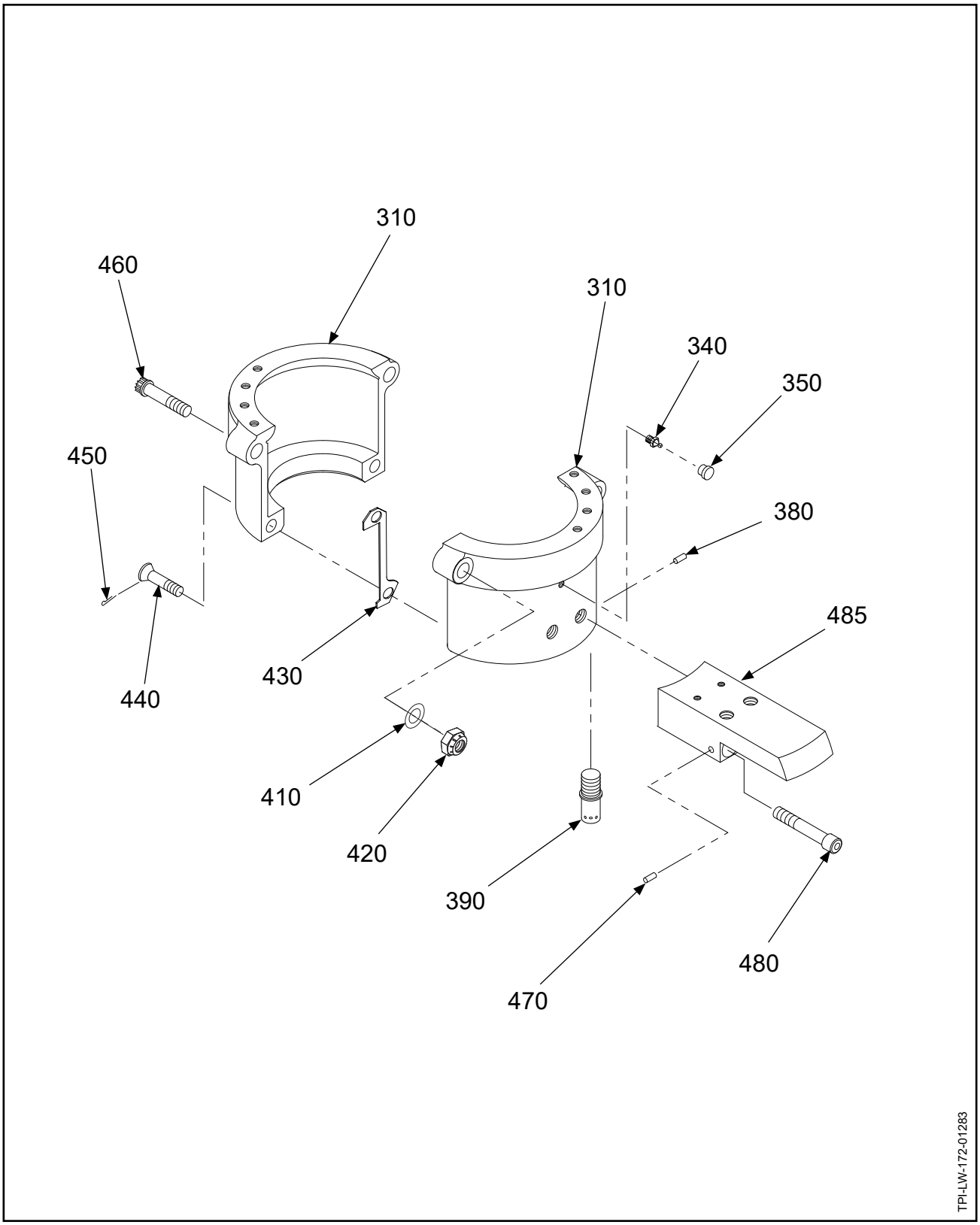
838-1023L: Clamp Assembly
Figure 10A-24

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-24		**838-1023L: CLAMP ASSEMBLY PARTS**				
300	838-1023L	PCP: CLAMP ASSEMBLY		1		PCP
310	D-6831-5AL	• PCP: CLAMP, BLADE, "MV" SHANK		1		PCP
340	B-6588-1	• FITTING, LUBRICATION		2	Y	
350	B-6544	• CAP, FITTING, LUBRICATION		2	Y	
-370	A-65	• DOWEL PIN, 1/4, REPLACED BY ITEM 375		1	Y	
-375	101375	• PLUG, PULL, REPLACES ITEM 370 POST HC-SB-61-285		AR	Y	
380	A-285	• SPRING PIN, 3/32", CRES		1		
390	A-304	• LINKSCREW, 1/2-20		1	Y	
410	A-2031	• WASHER, 3/8" - USED WITH ITEM 420		2	Y	
420	A-2043-1	• NUT, 3/8-24, HEX, SELF-LOCKING		2	Y	
430	A-6871-1	• CLAMP GASKET		2	Y	
440	A-321	• SCREW, 3/8-24 DOUBLE 60° HEAD, INBOARD CLAMP		2	Y	
450	B-3838-3-2	• COTTER PIN		2	Y	
460	A-2017	• BOLT, 3/8-24, 12 POINT, OUTBOARD CLAMP		2	Y	
470	A-285	• SPRING PIN, 3/32", CRES		2	Y	
470A	B-3838-3-2	• COTTER PIN - ALTERNATE FOR ITEM 470		2	Y	
480	A-2036-30	• SCREW, 7/16-20, CAP, MODIFIED, COUNTERWEIGHT REPLACED BY ITEM 480A		2	Y	
480A	107995-30	• BOLT, 7/16-20, 12 POINT, REPLACES ITEM 480 (COUNTERWEIGHT)		2	Y	
485	833-4L	• PCP: COUNTERWEIGHT UNIT		1		PCP

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

838-1023L: Clamp Assembly



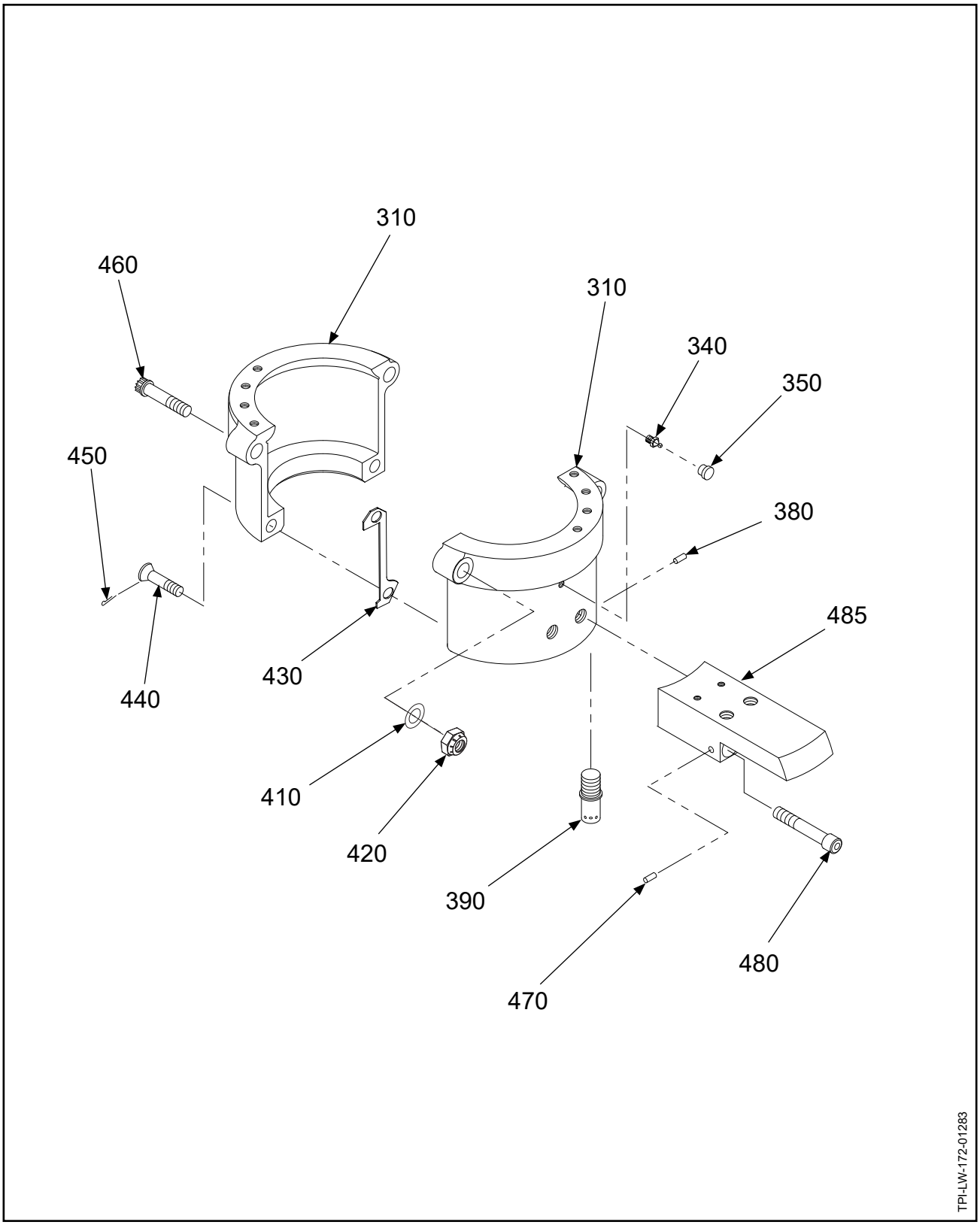
838-1052: Clamp Assembly
Figure 10A-25

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-25		**838-1052: CLAMP ASSEMBLY PARTS**				
300	838-1052	PCP: CLAMP ASSEMBLY		1		PCP
310	D-6831-5A	• PCP: CLAMP, BLADE, "MV" SHANK		1		PCP
340	B-6588-1	• FITTING, LUBRICATION		2	Y	
350	B-6544	• CAP, FITTING, LUBRICATION		2	Y	
-370	A-65	• DOWEL PIN, 1/4, REPLACED BY ITEM 375		1	Y	
-375	101375	• PLUG, PULL, REPLACES ITEM 370 POST HC-SB-61-285		AR	Y	
380	A-285	• SPRING PIN, 3/32", CRES		1		
390	A-304	• LINKSCREW, 1/2-20		1	Y	
410	A-2031	• WASHER, 3/8" - USED WITH ITEM 420		2	Y	
420	A-2043-1	• NUT, 3/8-24, HEX, SELF-LOCKING		2	Y	
430	A-6871-1	• CLAMP GASKET		2	Y	
440	A-321	• SCREW, 3/8-24 DOUBLE 60° HEAD, INBOARD CLAMP		2	Y	
450	B-3838-3-2	• COTTER PIN		2	Y	
460	A-2017	• BOLT, 3/8-24, 12 POINT, OUTBOARD CLAMP		2	Y	
470	A-285	• SPRING PIN, 3/32", CRES		2	Y	
470A	B-3838-3-2	• COTTER PIN - ALTERNATE FOR ITEM 470		2	Y	
480	A-2036-32	• SCREW, 7/16-20, CAP, MODIFIED, COUNTERWEIGHT REPLACED BY ITEM 480A		2	Y	
480A	107995-32	• BOLT, 7/16-20, 12 POINT, REPLACES ITEM 480 (COUNTERWEIGHT)		2	Y	
485	833-26	• PCP: COUNTERWEIGHT UNIT		1		PCP

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

838-1052: Clamp Assembly



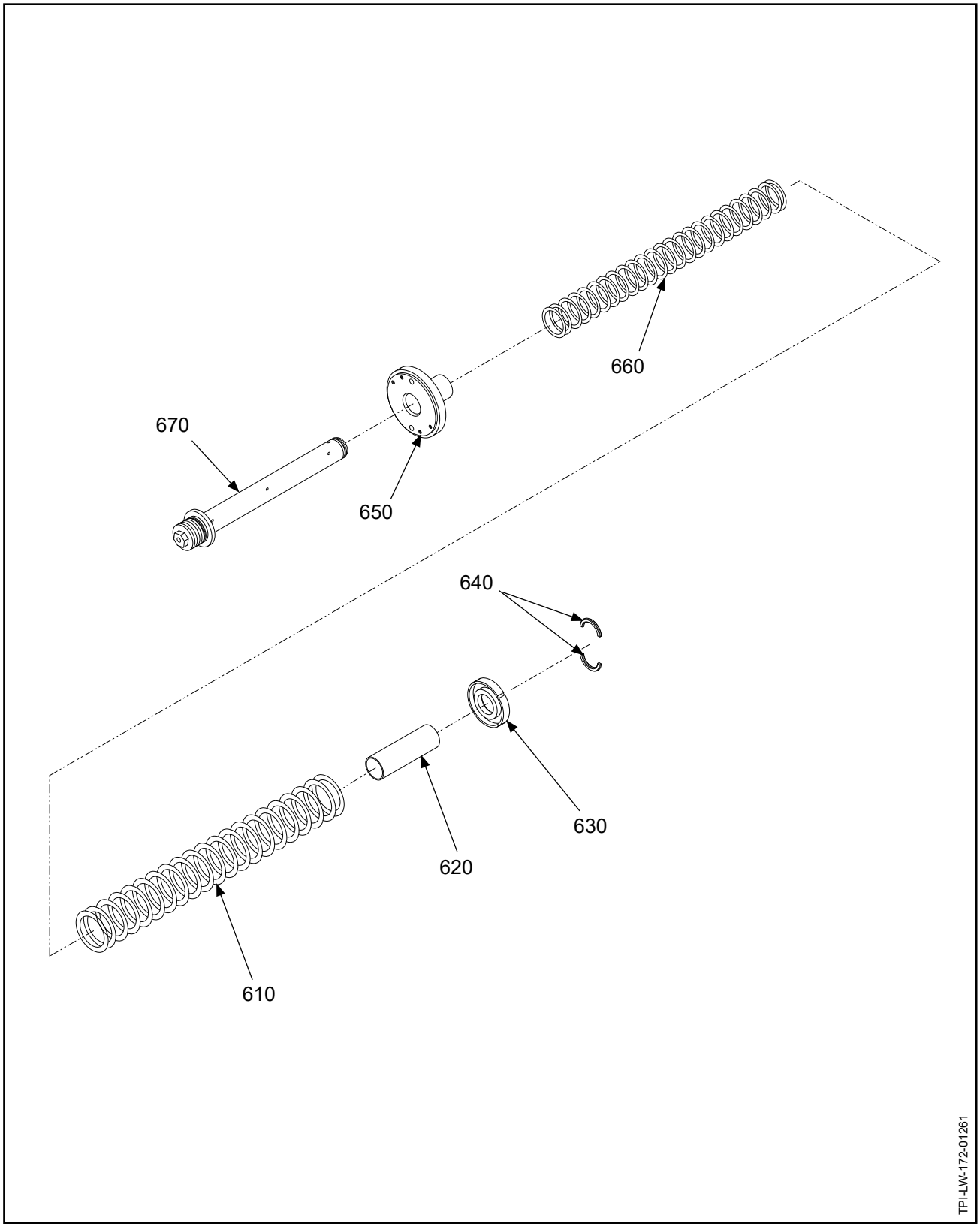
838-1060: Clamp Assembly
Figure 10A-26

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-26		**838-1060: CLAMP ASSEMBLY PARTS**				
300A	838-1060	CLAMP ASSEMBLY		1		
310	D-6831-5A	• PCP: CLAMP, BLADE, "MV" SHANK		1		PCP
340	B-6588-1	• FITTING, LUBRICATION		2	Y	
350	B-6544	• CAP, FITTING, LUBRICATION		2	Y	
-370	A-65	• DOWEL PIN, 1/4, REPLACED BY ITEM 375		1	Y	
-375	101375	• PLUG, PULL, REPLACES ITEM 370 POST HC-SB-61-285		AR	Y	
380	A-285	• SPRING PIN, 3/32", CRES		1	Y	
390	A-304	• LINKSCREW, 1/2-20		1	Y	
410	A-2031	• WASHER, 3/8" - USED WITH ITEM 420		2	Y	
420	A-2043-1	• NUT, 3/8-24, HEX, SELF-LOCKING		2	Y	
430	A-6871-1	• CLAMP GASKET		2	Y	
440	A-321	• SCREW, 3/8-24 DOUBLE 60° HEAD, INBOARD CLAMP		2	Y	
450	B-3838-3-2	• COTTER PIN		2	Y	
460	A-2017	• BOLT, 3/8-24, 12 POINT, OUTBOARD CLAMP		2	Y	
470	A-285	• SPRING PIN, 3/32", CRES		2	Y	
470A	B-3838-3-2	• COTTER PIN - ALTERNATE FOR ITEM 470		2	Y	
480	A-2036-32	• SCREW, 7/16-20, CAP, MODIFIED, COUNTERWEIGHT REPLACED BY ITEM 480A		2	Y	
480A	107995-32	• BOLT, 7/16-20, 12 POINT, REPLACES ITEM 480 (COUNTERWEIGHT)		2	Y	
485	B-1437-1	• COUNTERWEIGHT		1		

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

838-1060: Clamp Assembly



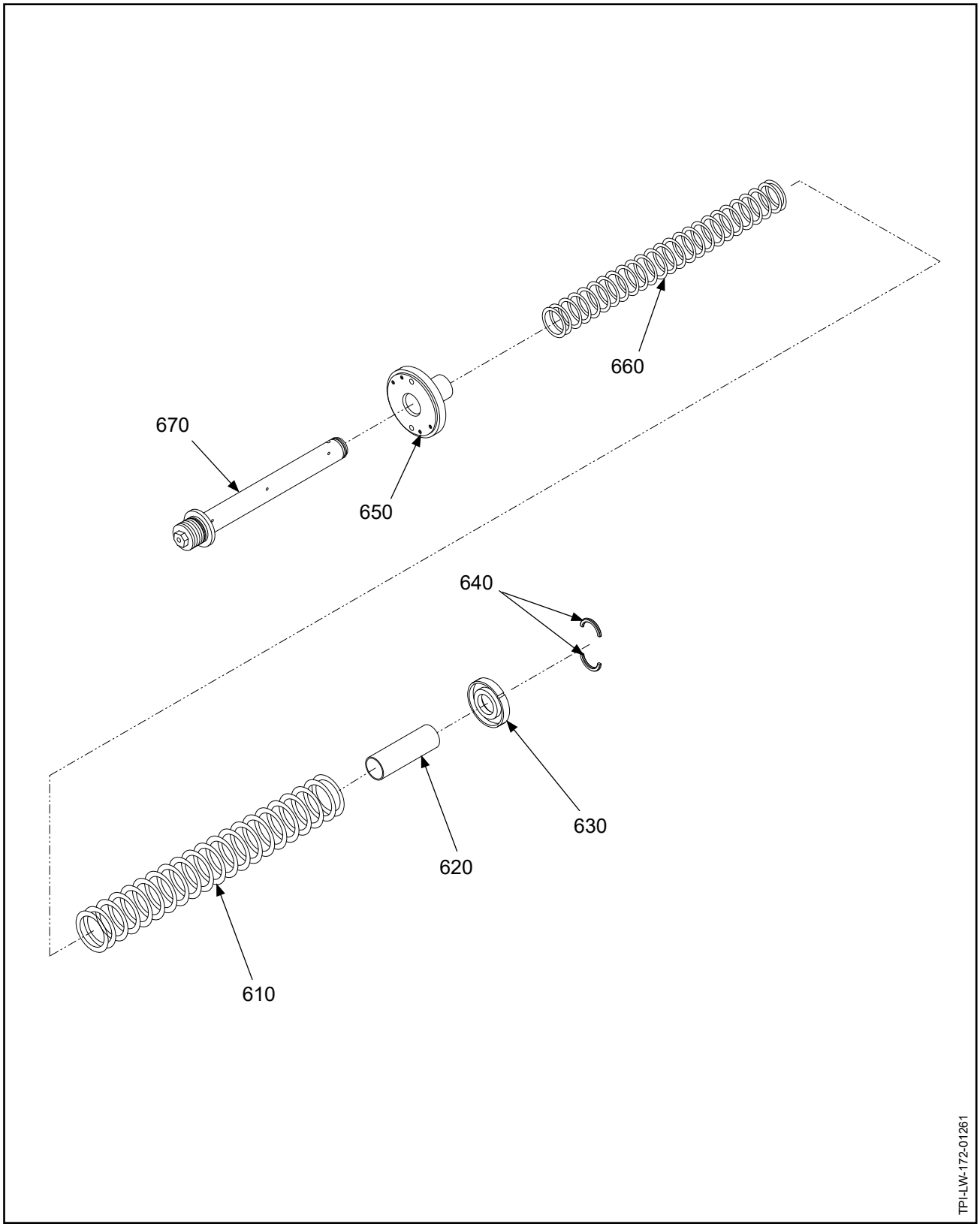
831-1A: Feathering Spring Assembly
Figure 10A-27

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-27		**831-1A: FEATHERING SPRING ASSEMBLY PARTS**				
600	831-1A	FEATHERING SPRING ASSEMBLY		1		
610	B-953	• SPRING, COMPRESSION, FEATHERING		1		
620	A-860-1	• SLEEVE, STOP		1		
630	A-857-1	• SPRING RETAINER, REAR		1		
640	A-858	• KEEPER, SPLIT		1	Y	
650	A-856	• SPRING RETAINER, FLANGED		1		
660	B-853	• PCP: SPRING, COMP, FEATHERING		1		PCP
670	B-855-2A	• ROD, PITCH CHANGE		1		

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

831-1A: Feathering Spring Assembly



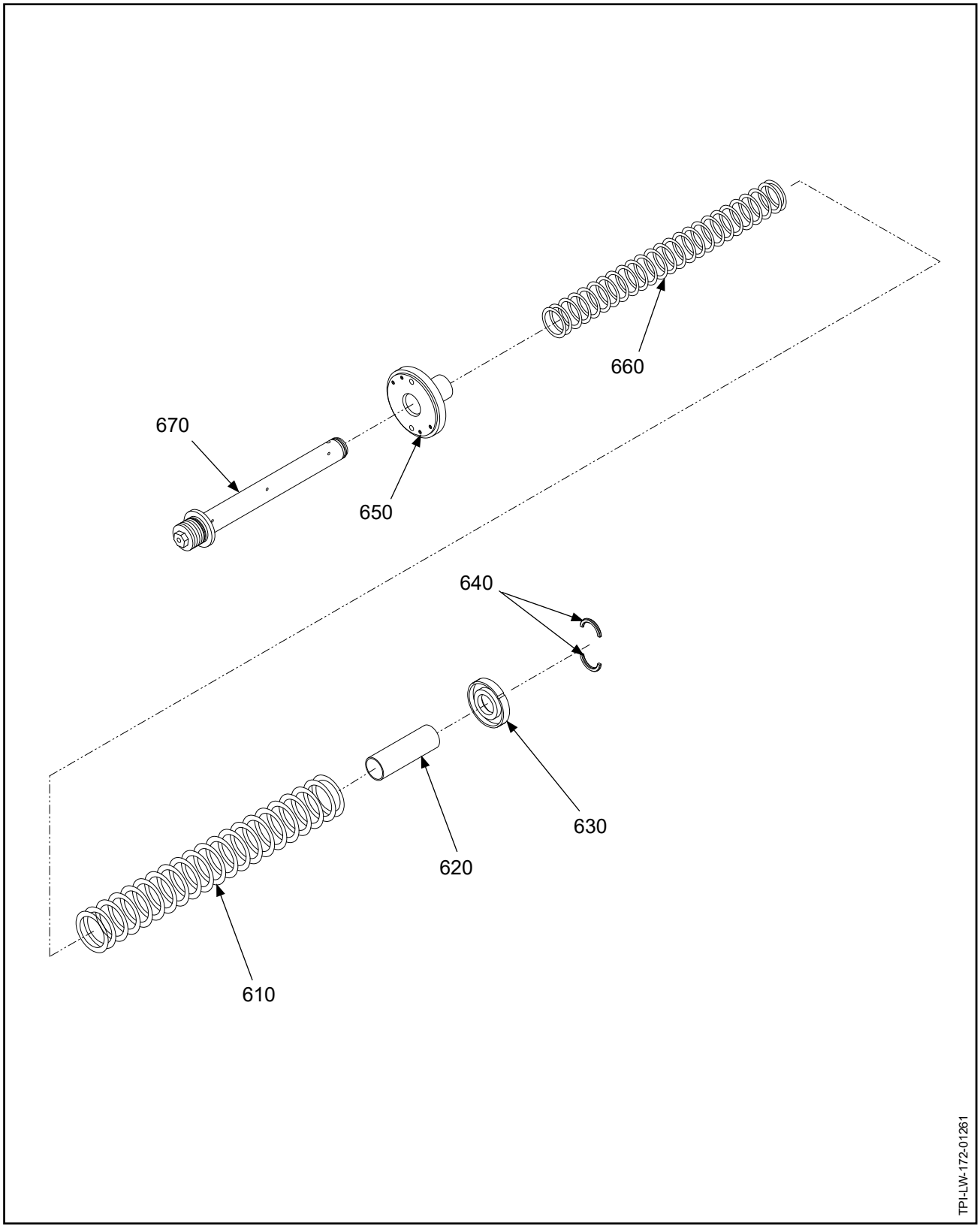
831-4: Feathering Spring Assembly
Figure 10A-28

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-28		**831-4: FEATHERING SPRING ASSEMBLY PARTS**				
600	831-4	FEATHERING SPRING ASSEMBLY		1		
610	B-953	• SPRING, COMPRESSION, FEATHERING		1		
620	A-860-3	• SLEEVE, STOP		1		
630	A-857	• SPRING RETAINER, REAR		1		
640	A-858	• KEEPER, SPLIT		1	Y	
650	A-856	• SPRING RETAINER, FLANGED		1		
660	B-853	• PCP: SPRING, COMP, FEATHERING		1		PCP
670	B-855-A	• ROD, PITCH CHANGE		1		

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

831-4: Feathering Spring Assembly



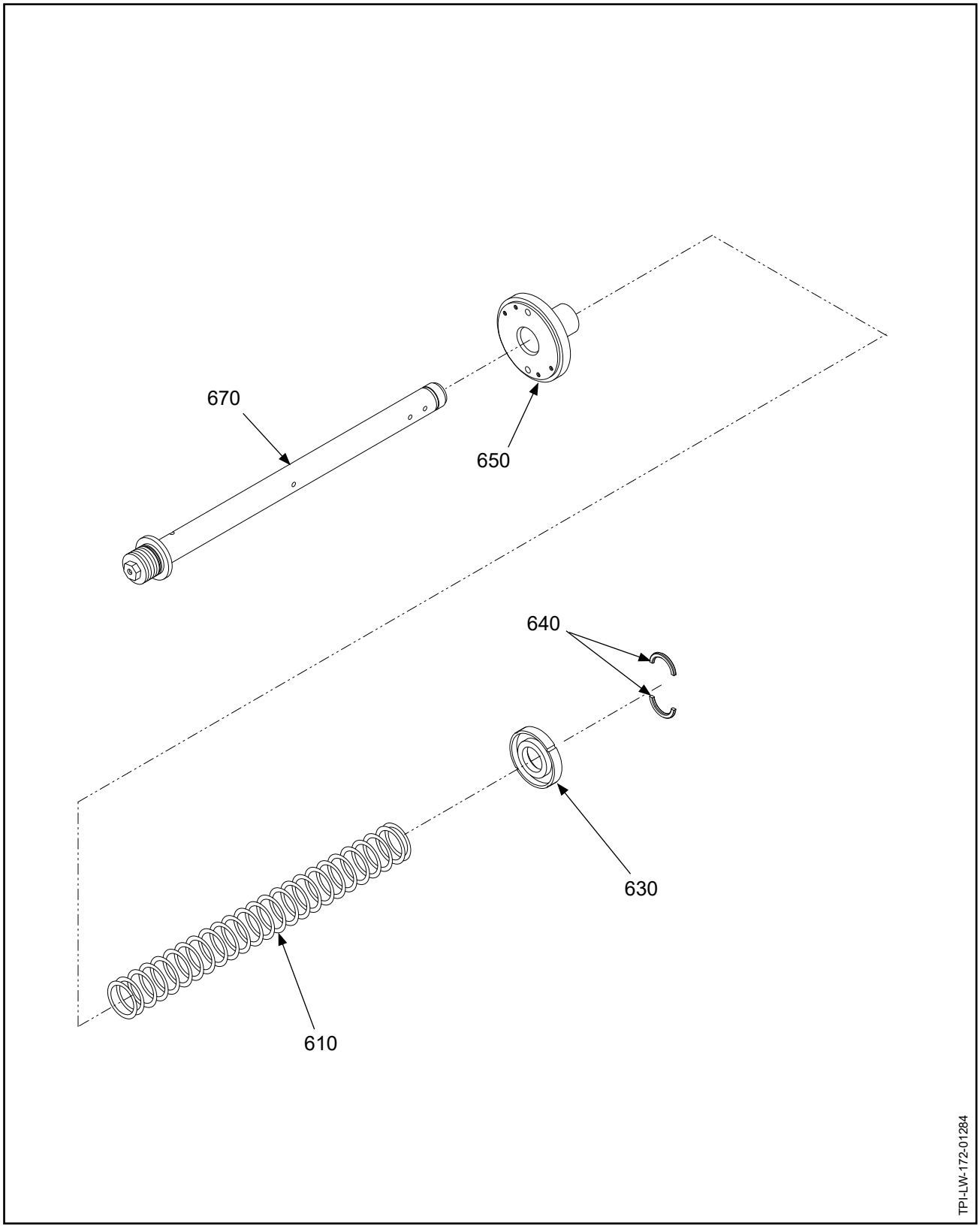
831-5A: Feathering Spring Assembly
Figure 10A-29

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-29		**831-5A: FEATHERING SPRING ASSEMBLY PARTS**				
600	831-5A	FEATHERING SPRING ASSEMBLY		1		
610	B-953	• SPRING, COMPRESSION, FEATHERING		1		
620	A-860-1	• SLEEVE, STOP		1		
630	A-857	• SPRING RETAINER, REAR		1		
640	A-858	• KEEPER, SPLIT		1	Y	
650	A-856	• SPRING RETAINER, FLANGED		1		
660	B-853	• PCP: SPRING, COMP, FEATHERING		1		PCP
670	B-855-A	• ROD, PITCH CHANGE		1		

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

831-5A: Feathering Spring Assembly



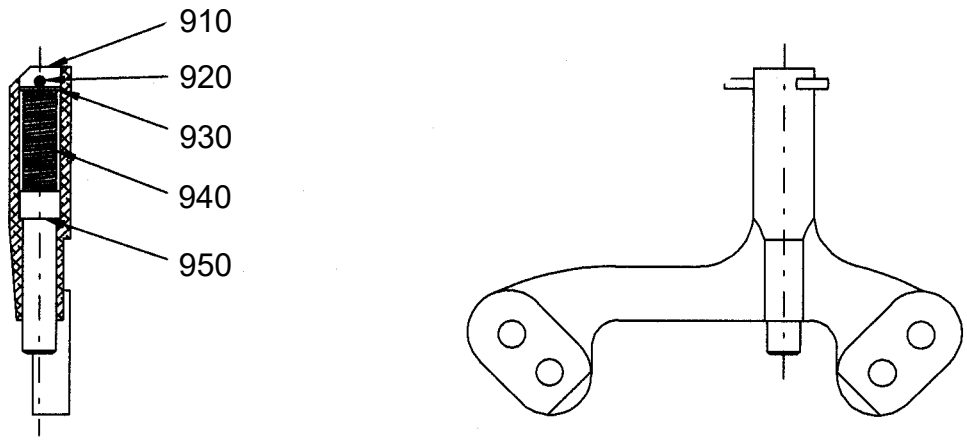
831-84: Feathering Spring Assembly
Figure 10A-30

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-30		**831-84: SPRING ASSEMBLY PARTS**				
600	831-84	SPRING ASSEMBLY		1		
610	B-1363-1	• PCP: SPRING, COMP, FEATHERING		1		PCP
630	A-866	• SPRING RETAINER, REAR		1		
640	A-867	• PCP: SPLIT KEEPER, REAR		1	Y	PCP
650	A-871	• SPRING RETAINER, FLANGED		1		
670	D-5862	• PCP: ROD, PITCH CHANGE		1		PCP

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

831-84: Feathering Spring Assembly



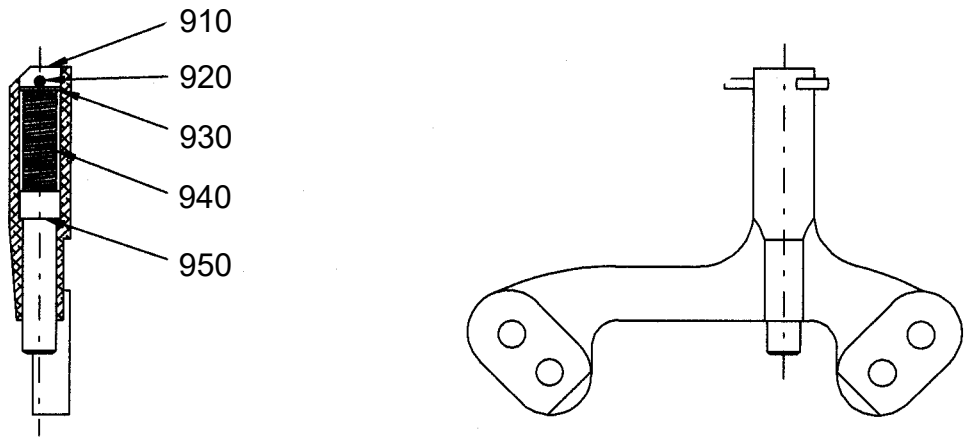
830-2: Start Lock Assembly
Figure 10A-31

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-31		**830-2: START LOCK ASSEMBLY PARTS**				
-900	830-2	START LOCK ASSEMBLY		1		
910	B-882-1	• BRACKET, START LOCK		1		
920	B-3838-3-3	• COTTER PIN		1	Y	
930	B3851-N832	• WASHER		1	Y	
940	A-884	• SPRING, COMPRESSION		1	Y	
950	A-883	• PIN, START LOCK		1		

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

830-2: Start Lock Assembly



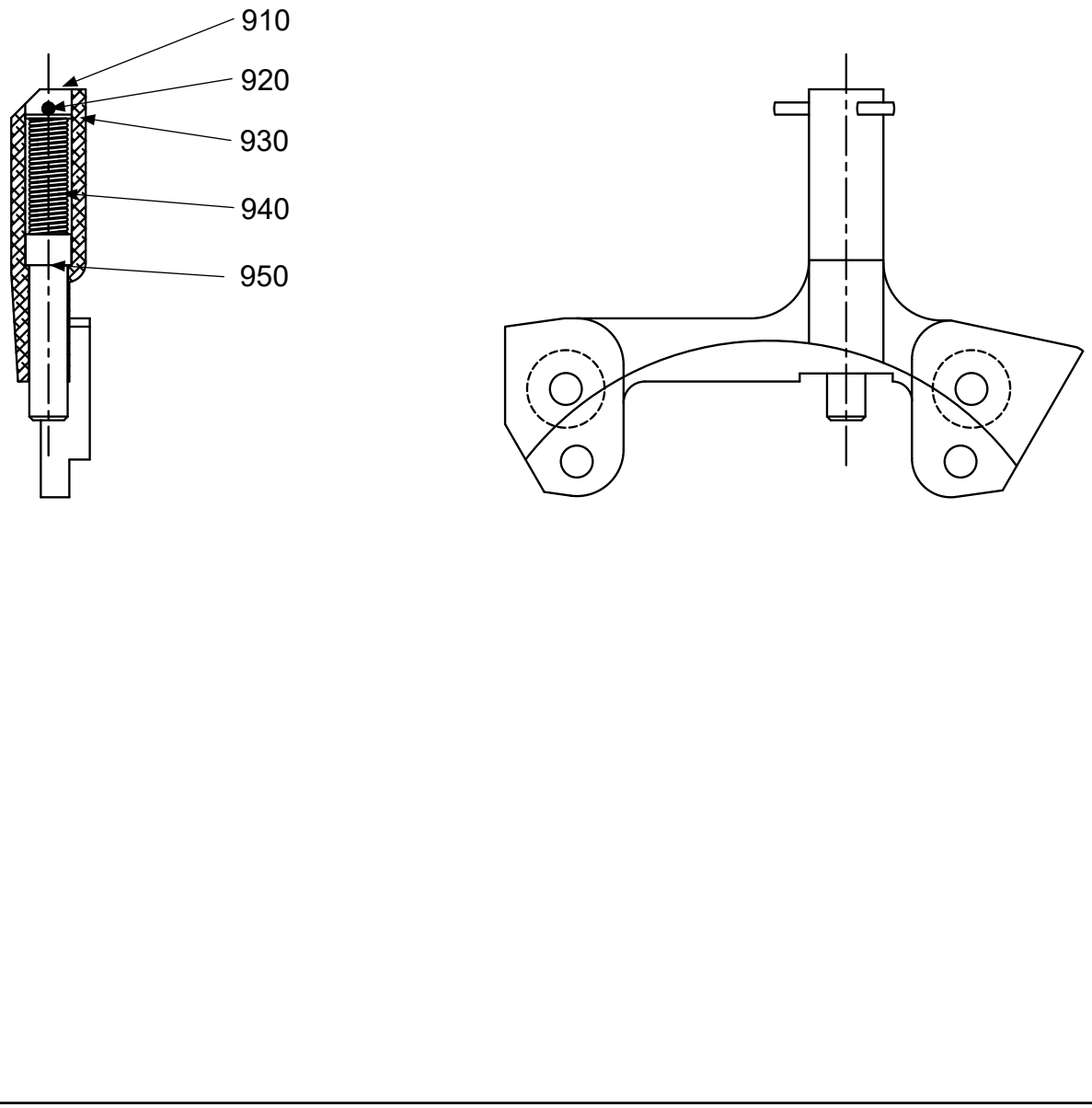
830-2A: Start Lock Assembly
Figure 10A-32

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-32		**830-2A: START LOCK ASSEMBLY PARTS**				
-900	830-2A	START LOCK ASSEMBLY		1		
910	B-882-1A	• BRACKET, START LOCK		1		
920	B-3838-3-3	• COTTER PIN		1	Y	
930	B3851-N832	• WASHER		1	Y	
940	A-884	• SPRING, COMPRESSION		1	Y	
950	A-883	• PIN, START LOCK		1		

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

830-2A: Start Lock Assembly



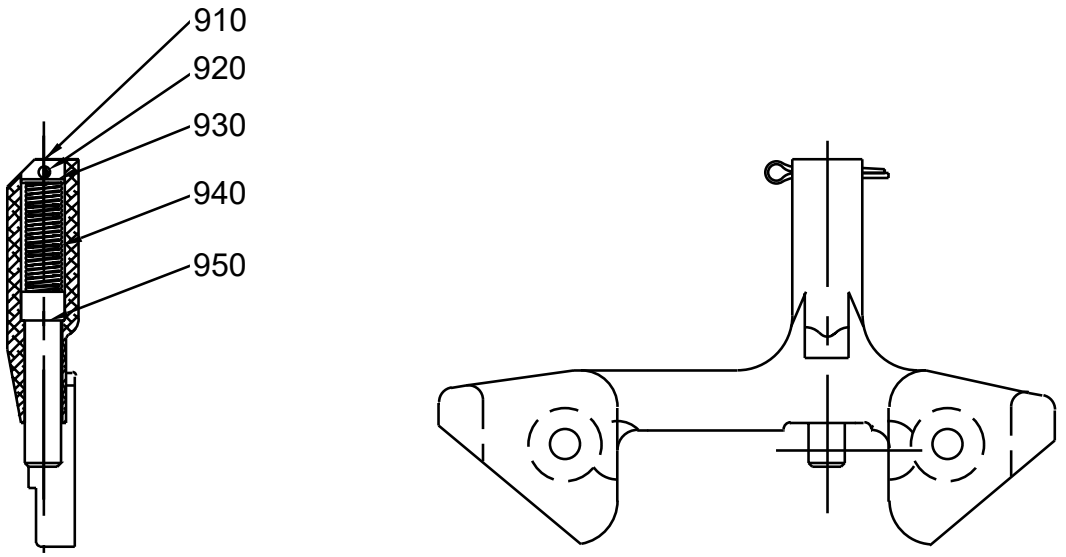
830-4: Start Lock Assembly
Figure 10A-33

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-33		**830-4: START LOCK ASSEMBLY PARTS**				
-900	830-4	START LOCK ASSEMBLY		1		
910	B-882-4	• BRACKET, START LOCK		1		
920	B-3838-3-3	• COTTER PIN		1	Y	
930	B3851-N832	• WASHER		1	Y	
940	A-884	• SPRING, COMPRESSION		1	Y	
950	A-883	• PIN, START LOCK		1		

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

830-4: Start Lock Assembly



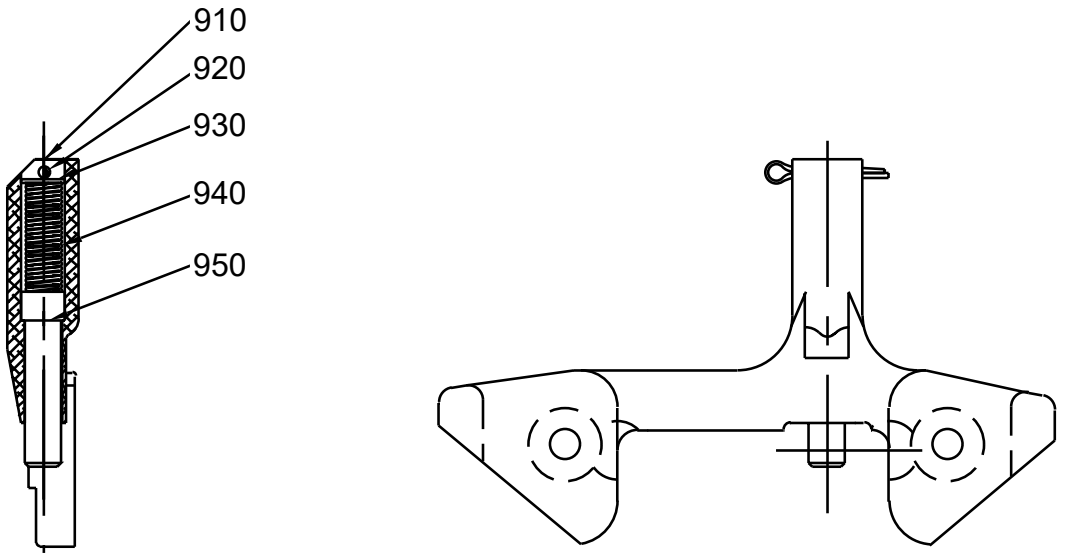
830-5: Start Lock Assembly
Figure 10A-34

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-34		**830-5: START LOCK ASSEMBLY PARTS**				
-900	830-5	START LOCK ASSEMBLY		1		
910	B-1353-5	• BRACKET, START LOCK		1		
920	B-3838-3-3	• COTTER PIN		1	Y	
930	B3851-N832	• WASHER		1	Y	
940	A-884	• SPRING, COMPRESSION		1	Y	
950	A-883	• PIN, START LOCK		1		

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

830-5: Start Lock Assembly



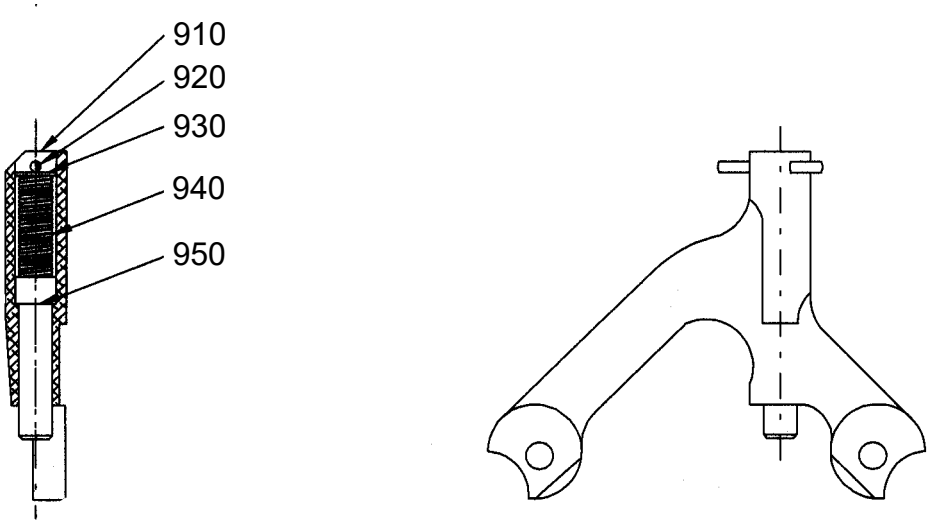
830-5L: Start Lock Assembly
Figure 10A-35

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-35		**830-5L: START LOCK ASSEMBLY PARTS**				
-900	830-5L	START LOCK ASSEMBLY		1		
910	B-1353-5L	• BRACKET, START LOCK		1		
920	B-3838-3-3	• COTTER PIN		1	Y	
930	B3851-N832	• WASHER		1	Y	
940	A-884	• SPRING, COMPRESSION		1	Y	
950	A-883	• PIN, START LOCK		1		

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

830-5: Start Lock Assembly



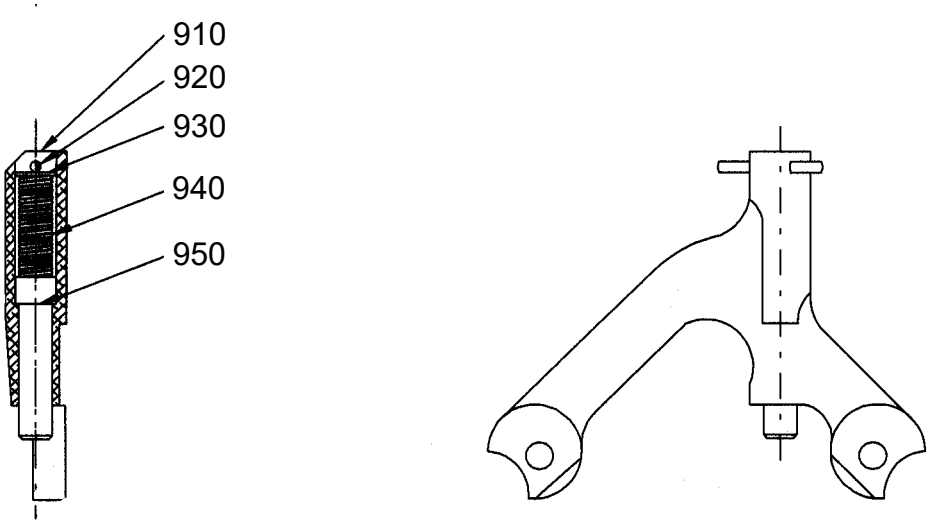
830-9: Start Lock Assembly
Figure 10A-36

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-36		**830-9: START LOCK ASSEMBLY PARTS**				
-900	830-9	START LOCK ASSEMBLY		1		
910	B-984	• BRACKET, START LOCK		1		
920	B-3838-3-3	• COTTER PIN		1	Y	
930	B3851-N832	• WASHER		1	Y	
940	A-884	• SPRING, COMPRESSION		1	Y	
950	A-883	• PIN, START LOCK		1		

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

830-9: Start Lock Assembly



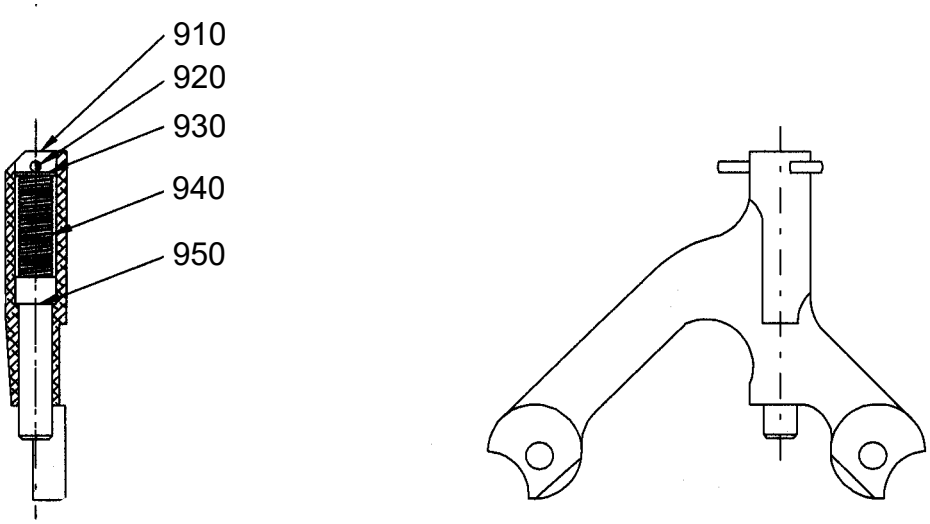
830-9A: Start Lock Assembly
Figure 10A-37

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-37		**830-9A: START LOCK ASSEMBLY PARTS**				
-900	830-9A	START LOCK ASSEMBLY		1		
910	B-984-1	• BRACKET, START LOCK		1		
920	B-3838-3-3	• COTTER PIN		1	Y	
930	B3851-N832	• WASHER		1	Y	
940	A-884	• SPRING, COMPRESSION		1	Y	
950	A-883	• PIN, START LOCK		1		

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

830-9A: Start Lock Assembly



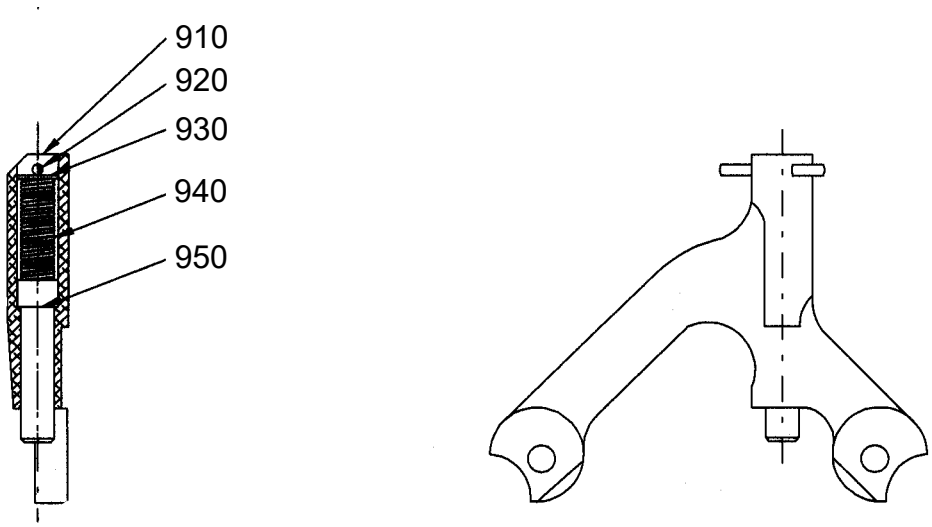
830-9B: Start Lock Assembly
Figure 10A-38

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-38		**830-9B: START LOCK ASSEMBLY PARTS**				
-900	830-9B	START LOCK ASSEMBLY		1		
910	B-984-2	• BRACKET, START LOCK		1		
920	B-3838-3-3	• COTTER PIN		1	Y	
930	B3851-N832	• WASHER		1	Y	
940	A-884	• SPRING, COMPRESSION		1	Y	
950	A-883	• PIN, START LOCK		1		

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

830-9B: Start Lock Assembly



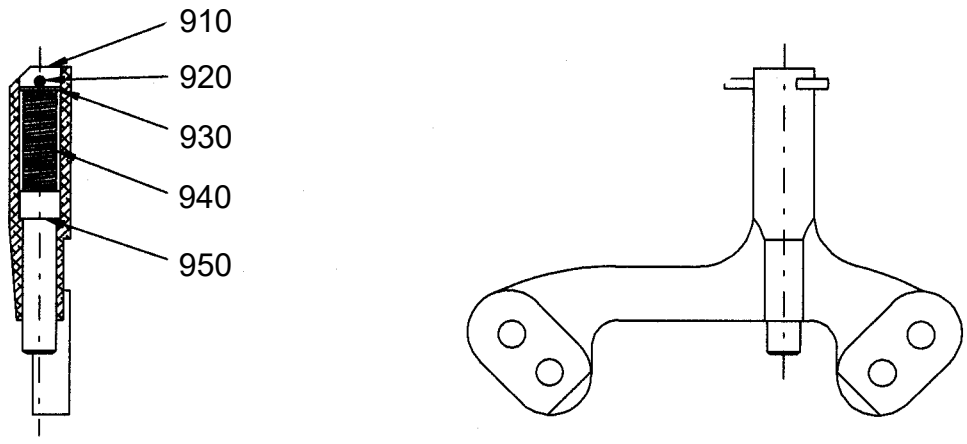
830-9L: Start Lock Assembly
Figure 10A-39

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-39		**830-9L: START LOCK ASSEMBLY PARTS**				
-900	830-9L	START LOCK ASSEMBLY		1		
910	B-984-L	• BRACKET, START LOCK		1		
920	B-3838-3-3	• COTTER PIN		1	Y	
930	B3851-N832	• WASHER		1	Y	
940	A-884	• SPRING, COMPRESSION		1	Y	
950	A-883	• PIN, START LOCK		1		

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

830-9L: Start Lock Assembly



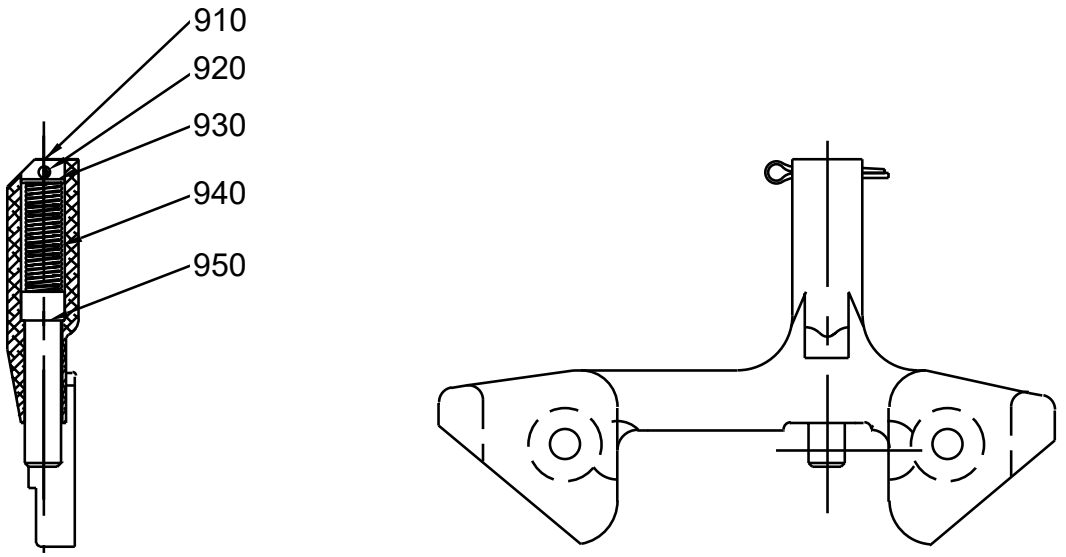
830-12: Start Lock Assembly
Figure 10A-40

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-40		**830-12: START LOCK ASSEMBLY PARTS**				
-900	830-12	START LOCK ASSEMBLY		1		
910	B-882-12	• BRACKET, START LOCK		1		
920	B-3838-3-3	• COTTER PIN		1	Y	
930	B3851-N832	• WASHER		1	Y	
940	A-884	• SPRING, COMPRESSION		1	Y	
950	A-883	• PIN, START LOCK		1		

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

830-12: Start Lock Assembly



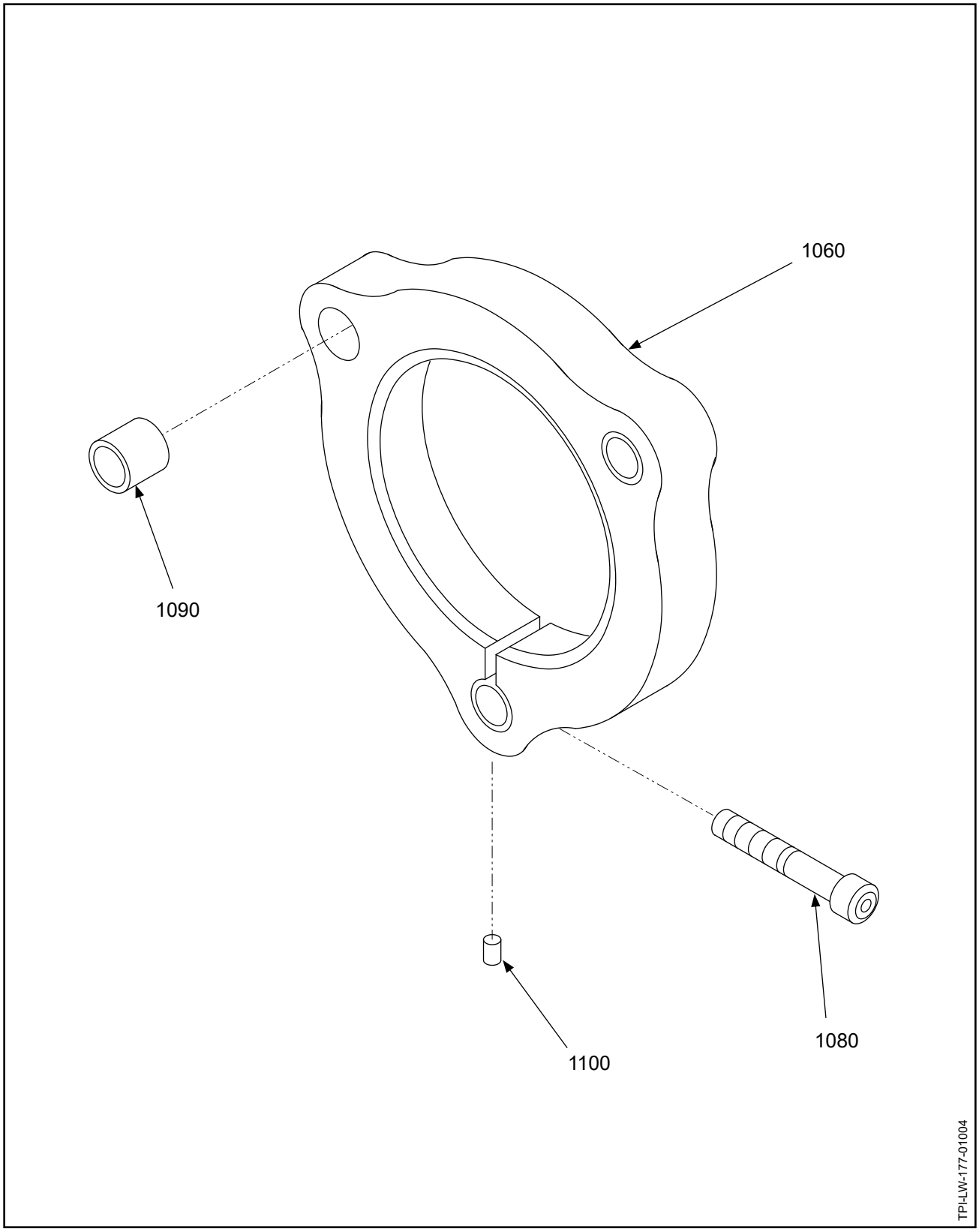
830-18: Start Lock Assembly
Figure 10A-41

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-41		**830-18: START LOCK ASSEMBLY PARTS**				
-900	830-18	START LOCK ASSEMBLY		1		
910	B-1353-3	• BRACKET, START LOCK		1		
920	B-3838-3-3	• COTTER PIN		1	Y	
930	B3851-N832	• WASHER		1	Y	
940	A-884	• SPRING, COMPRESSION		1	Y	
950	A-883	• PIN, START LOCK		1		

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

830-18: Start Lock Assembly



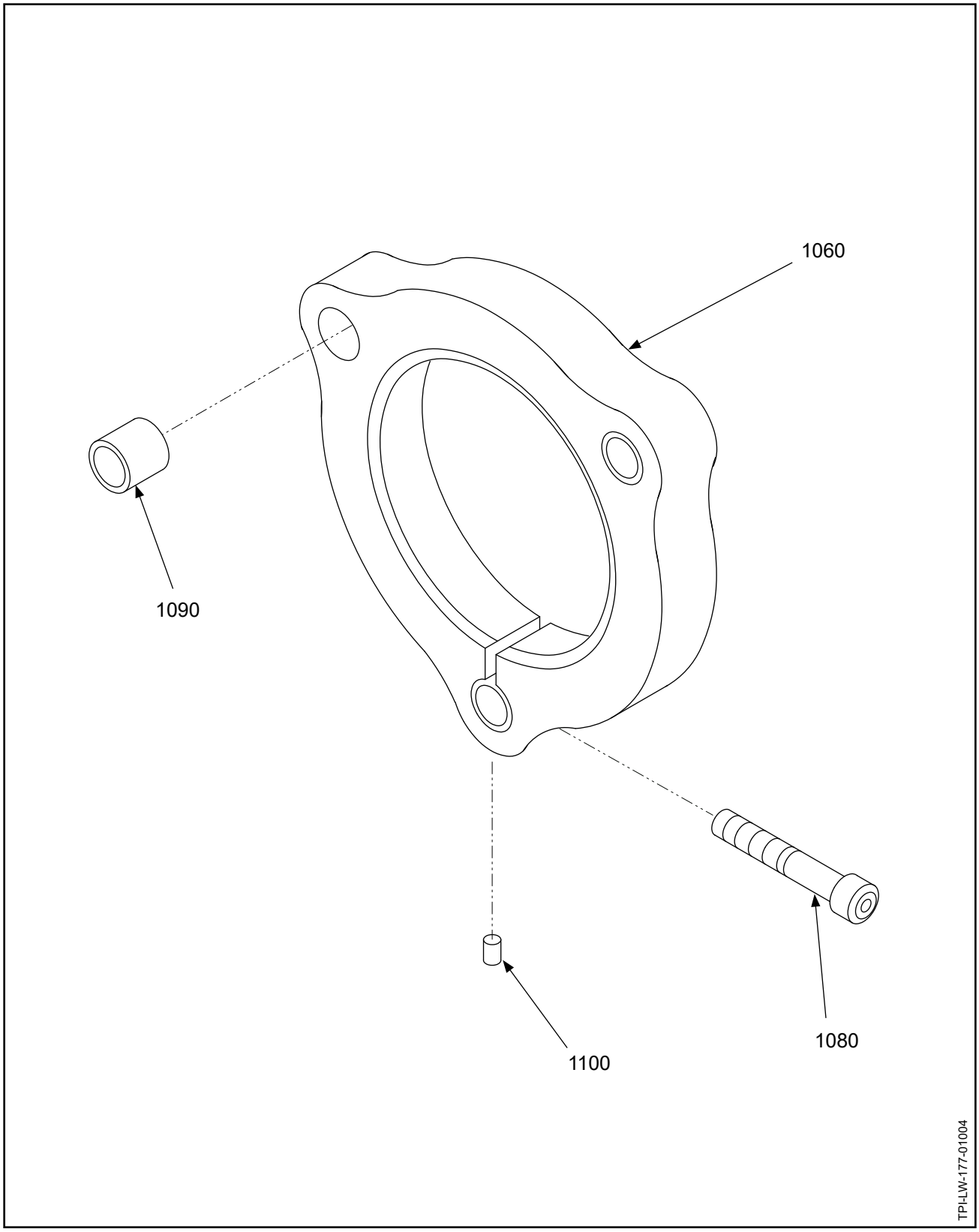
834-1: Guide Collar Unit
Figure 10A-42

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-42		**834-1: GUIDE COLLAR UNIT PARTS**				
1060	834-1	GUIDE COLLAR UNIT		1		
1080	A-2038-12	• SCREW, 1/4-28, CAP		1	Y	
1090	A-116-D1	• BUSHING, PLASTIC		1		
1100	A-114-C	• DOWEL PIN		3		

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

834-1: Guide Collar Unit



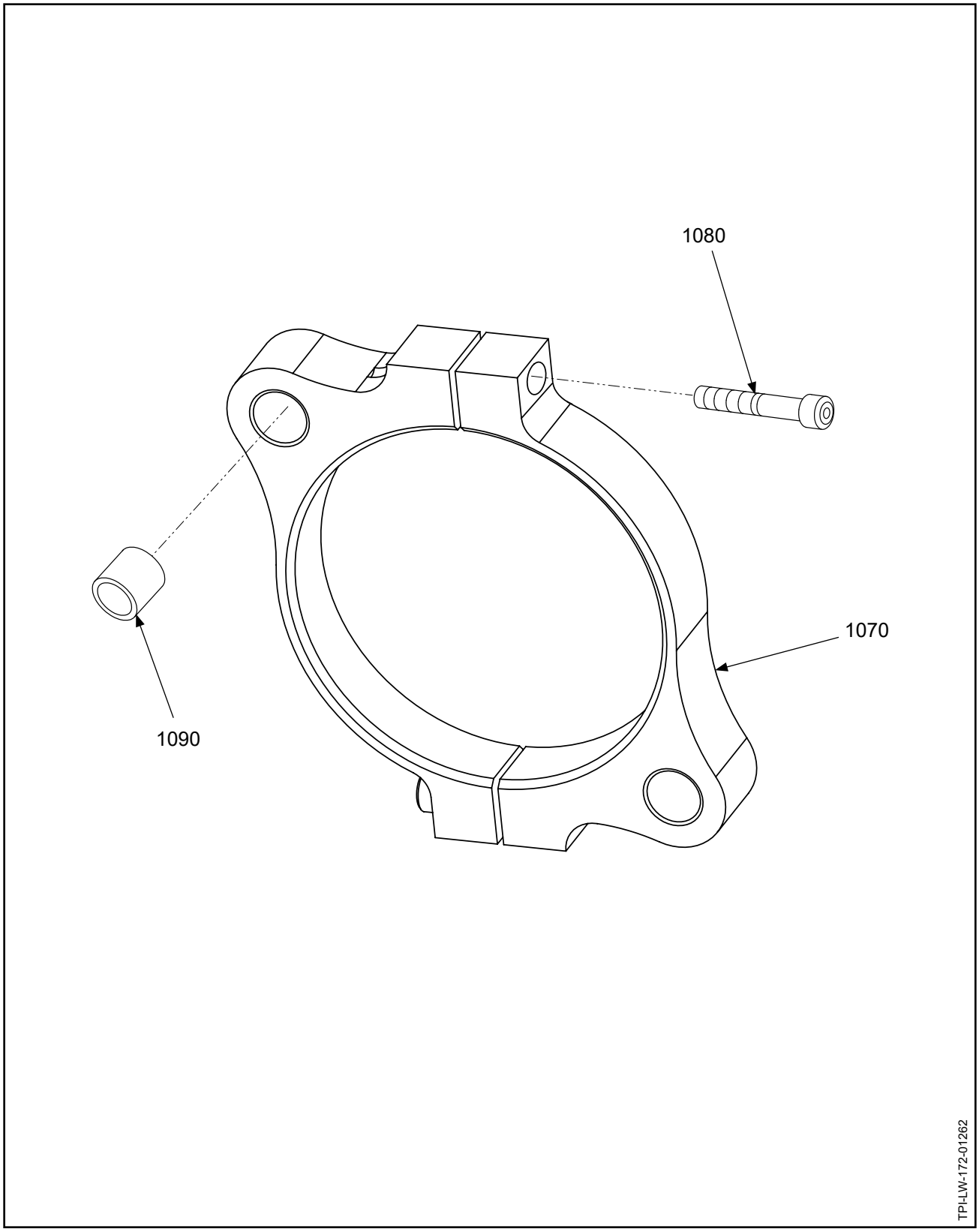
834-1L: Guide Collar Unit
Figure 10A-43

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-43		**834-1L: GUIDE COLLAR UNIT PARTS**				
1060	834-1L	GUIDE COLLAR UNIT		1		
1080	A-2038-12	• SCREW, 1/4-28, CAP		1	Y	
1090	A-116-D1	• BUSHING, PLASTIC		1		
1100	A-114-C	• DOWEL PIN		3		

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

834-1L: Guide Collar Unit



834-2A: Guide Collar Unit
Figure 10A-44

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H	PCP
10A-44		**834-2A: GUIDE COLLAR UNIT PARTS**				
-1060	834-2A	GUIDE COLLAR UNIT		1		
1070	B-892-A	• GUIDE COLLAR		1		
1080	A-2038-12	• SCREW, 1/4-28, CAP		1	Y	
1090	A-116-D1	• BUSHING, PLASTIC		1		

EFFECTIVITY	MODEL	EFFECTIVITY	MODEL

- ITEM NOT ILLUSTRATED

834-2A: Guide Collar Unit

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