

## HARTZELL PROPELLER LLC

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

### MANUAL REVISION TRANSMITTAL Manual 180 (30-61-80) Ice Protection System Manual

**REVISION 43 dated February 2024**

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

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

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

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**Manual No. 180**

**30-61-80**

**Revision 43**

**February 2024**



# **Ice Protection System Manual**

**Hartzell Propeller LLC**

**One Propeller Place**

**Piqua, Ohio 45356-2634 U.S.A.**

**Phone: 937.778.4200**

**Fax: 937.778.4215**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

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### REVISION 43 HIGHLIGHTS

Revision 43, dated February 2024, incorporates the following:

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

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

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

#### DISASSEMBLY

- Revised the section, "Removal of Propeller Ice Protection Components"

#### DE-ICE BOOT INSTALLATION/REMOVAL

- Revised the section, "Erosion Tape Removal/Installation (Metal and Composite Blades)"
- Revised Table 3-3, "De-ice Boot Location - 'A' Dimension"

#### CHECK

- Revised Table 5-3, "Anti-ice System 200-Hour Inspection"
- Revised Table 5-4, "Anti-ice System Component Inspection Criteria"

#### REPAIR/MODIFICATION

- Revised the section, "Slinger Ring Replacement for Bulkhead Units 104744 and 106109"
- Added the section, "Fitting Installation for Slinger Ring p/n 107636"

#### ANTI-ICE KIT INSTALLATION and PARTS

- Revised the parts list for anti-ice kit A-2374-1
- Revised Installation Instruction 10O, applicable Figures, and the parts list for anti-ice kit 107638
- Revised Installation Instruction 10T to add anti-ice kit A-2167

#### DE-ICE KIT INSTALLATION and PARTS

- Revised Installation Instruction 11CI, applicable Figures, and the parts list for de-ice kit 103769
- Revised Installation Instruction EH, Figure EH-3 and Figure EH-4 for de-ice kit 106863

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REVISION 43 HIGHLIGHTS

1. Introduction

A. General

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

B. Components

- (1) Revision No. indicates the revisions incorporated in this manual.
- (2) Issue Date is the date of the revision.
- (3) Comments indicates the level of the revision.
- (a) New Issue is a new manual distribution. The manual is distributed in its entirety. All the 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 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.

<u>Revision No.</u>	<u>Issue Date</u>	<u>Comments</u>
Original	Jul/06	New Issue
1	Nov/06	Major Revision
2	Jun/07	Major Revision
3	Feb/08	Minor Revision
4	Jan/09	Minor Revision
5	Apr/09	Minor Revision
6	Aug/09	Major Revision
7	Dec/09	Minor Revision
8	Apr/10	Minor Revision
9	Jul/10	Minor Revision
10	Feb/11	Minor Revision
11	Jun/11	Minor Revision
12	Oct/11	Minor Revision

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<u>Revision No.</u>	<u>Issue Date</u>	<u>Comments</u>
13	Jun/12	Minor Revision
14	Jan/13	Minor Revision
15	May/13	Minor Revision
16	Oct/13	Minor Revision
17	Dec/13	Minor Revision
18	Mar/14	Minor Revision
19	May/15	Minor Revision
20	Dec/15	Minor Revision
21	Aug/16	Minor Revision
22	Nov/16	Minor Revision
23	Feb/17	Minor Revision
24	May/17	Minor Revision
25	Jul/17	Minor Revision
26	Dec/17	Minor Revision
27	Aug/18	Reissue
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29	Sep/19	Minor Revision
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37	Nov/21	Minor Revision
38	Jun/22	Minor Revision
39	Dec/22	Major Revision
40	Apr/23	Minor Revision
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43	Feb/24	Minor Revision



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**RECORD OF REVISIONS**

This is a record of revisions inserted into this manual.

Revision Number	Issue Date	Date Inserted	Inserted By
1	Nov/06	Nov/06	HPI
2	Jun/07	Jun/07	HPI
3	Feb/08	Feb/08	HPI
4	Jan/09	Jan/09	HPI
5	Apr/09	Apr/09	HPI
6	Aug/09	Aug/09	HPI
7	Dec/09	Dec/09	HPI
8	Apr/10	Apr/10	HPI
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20	Dec/15	Dec/15	HPI
21	Aug/16	Aug/16	HPI

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23	Feb/17	Feb/17	HPI
24	May/17	May/17	HPI
25	Jul/17	Jul/17	HPI
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37	Nov/21	Nov/21	HPI
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41	Sep/23	Sep/23	HPI
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SERVICE DOCUMENT LIST

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

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

Service Document Number	Incorporation Rev./Date
HC-SL-30-231	Original Nov/06
HC-SL-61-236	Rev. 10 Feb/11
HC-SL-30-247	Rev. 7 Dec/09
HC-SL-30-295, Rev. 3	Rev. 17 Dec/13
HC-SL-30-304, Rev. 2	Rev.18 Mar/14
HC-SL-61-347	Rev. 20 Dec/15
HC-SB-30-352, Rev. 1	Rev. 19 May/15
HC-SB-30-362	Rev. 20 Dec/15
HC-SL-30-365	Rev. 30 Nov/19
HC-SB-30-366	Rev. 20 Dec/15
HC-SL-30-369	Rev. 38 Jun/22
HC-SB-30-375	Rev. 23 Feb/17

Service Document Number	Incorporation Rev./Date

### SERVICE DOCUMENT LIST, continued

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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 the applicable Hartzell Propeller owner's manual.

FAA APPROVED  
AIR-7C3  
MAR 6 2019  
Mark Grace  
CHICAGO ACO BRANCH  
C & A DIVISION  
No Technical changes  
Format only

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1. General

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 approved Instructions for Continued Airworthiness (ICA) for propeller ice protection system components supplied by Hartzell Propeller Inc. It is intended for use in propeller repair stations by personnel that are trained and experienced with Hartzell products.
  - (a) This manual does not provide complete information for an inexperienced technician to attempt ice protection system maintenance without supervision.
- (3) This manual is intended to be the primary source of maintenance and overhaul information for ice protection systems supplied by Hartzell Propeller Inc.
  - (a) Ice protection system components supplied by Hartzell Propeller Inc. may be identified by a "7931-" prefix to the part number. The "7931-" prefix is not stamped on the part. The "7931-" prefix is used for ordering of parts only.
  - (b) Ice protection system components supplied by other manufacturer may have the same part number as the ice protection system components that shipped from Hartzell Propeller Inc. These ice protection system components will be identified as FAA-PMA in accordance with 14CFR 45-15. Instructions in this manual may or may not be applicable to any ice protection system component that is FAA-PMA.
  - (c) Information about ice protection systems and/or components not supplied by Hartzell Propeller Inc. must be obtained from the aircraft TC or STC holder's ICA.
- (4) 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.
- (5) The instructions specified in this manual supersede instructions published by any de-ice boot manufacturer for installation of a de-ice boot when installed on a Hartzell Propeller Inc. propeller.
- (6) The instructions specified in this manual supersede instructions published in Hartzell Propeller Inc. Aluminum Blade Manual 133C (61-13-33), Hartzell Propeller Inc. Maintenance Manual for Composite Blades 135F (61-13-35), and Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).

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- (7) Hartzell Propeller Inc. recommends using the instructions in this manual for installation of conventional rubber de-ice boots supplied by a source other than Hartzell Propeller Inc. when installed on a Hartzell Propeller Inc. propeller. The source of the rubber de-ice boots is responsible for providing installation approval and installation instructions.
- (8) Where possible, this manual is written in the format specified by ATA iSpec 2200.

## 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) The following publications are referenced in this manual for additional information regarding Hartzell Propeller Inc. ice protection systems.

<b>Manual No. (ATA No.)</b>	<b>Available at www.hartzellprop.com</b>	<b>Hartzell Propeller Inc. Manual Title</b>
n/a	Yes	Active Hartzell Propeller Inc. Service Bulletins, Service Letters, Service Instructions, and Service Advisories
Manual 133C (61-13-33)	-	Hartzell Propeller Inc. Aluminum Blade Overhaul Manual
Manual 135F (61-13-35)	-	Hartzell Propeller Inc. Composite Propeller Blade Maintenance Manual
Manual 159 (61-02-59)	Yes	Hartzell Propeller Inc. Application Guide
Manual 165A (61-00-65)	Yes	Hartzell Propeller Inc. Illustrated Tool and Equipment Manual
Manual 202A (61-01-02)	Vol. 7, Yes	Hartzell Propeller Inc. Standard Practices Manual, Volumes 1 through 11

### B. Vendor Publications

None



### 3. Personnel Requirements

#### 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. 1)

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 and in the propeller owner's manual.
- (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. 1)

**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

**NOTE:** Ice protection system components supplied by Hartzell Propeller Inc. do not require time tracking unless specifically required in Hartzell Propeller Inc. service publications.

- (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 for ice protection system components is determined by the propeller installation/overhaul interval.
  - (a) Overhaul intervals are specified in the applicable Hartzell Propeller Inc. propeller owner's manual and Hartzell Service Letter HC-SL-61-61Y.
  - (b) At such specified periods, the ice protection system components must be completely disassembled and inspected for cracks, wear, corrosion, and other unusual or abnormal conditions.
  - (c) Parts that are not replaced at overhaul must be inspected in accordance with the Check chapter of this manual.
    - 1 Parts that must be replaced at overhaul are identified by a "Y" in the O/H column of the parts list in the applicable chapter of this manual.
- (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.
- (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 blade 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. Illustrated Parts List: Description of Columns

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. Units Per Assembly (UPA)**

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

**E. Overhaul (O/H)**

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

11. 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.

12. 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](http://www.hartzellprop.com).

B. Technical Publications Department

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

Hartzell Propeller Inc.	Telephone: 937.778.4200
Attn: Technical Publications Department	Fax: 937.778.4215
One Propeller Place	E-mail: <a href="mailto:manuals@hartzellprop.com">manuals@hartzellprop.com</a>
Piqua, Ohio 45356-2634 U.S.A.	



**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](http://www.hartzellprop.com).

**13. Definitions** (Rev. 4)

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

<b>Term</b>	<b>Definition</b>
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 <u>Note:</u> Do not confuse <i>blade station</i> with <i>reference blade radius</i> ; they may not originate at the same location.
Blemish	An imperfection with visible attributes, but having no impact on safety or utility

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<b>Term</b>	<b>Definition</b>
Brinelling	A depression caused by failure of the material in compression
Bulge	An outward curve or bend
Camber	The surface of the blade that is directed toward the front of the aircraft. It is the low pressure, or suction, side of the blade. The camber side is convex in shape over the entire length of the blade.
Chord	A straight line distance between the leading and trailing edges of an airfoil
Chordwise	A direction that is generally from the leading edge to the trailing edge of an airfoil
Co-bonded	The act of bonding a composite laminate and simultaneously curing it to some other prepared surface
Composite Material	Kevlar®, carbon, or fiberglass fibers bound together with, or encapsulated within an epoxy resin
Compression Rolling	A process that provides improved strength and resistance to fatigue
Constant Force	A force that is always present in some degree when the propeller is operating
Constant Speed	A propeller system that employs a governing device to maintain a selected engine RPM
Corrosion (Aluminum)	The chemical or electrochemical attack by an acid or alkaline that reacts with the protective oxide layer and results in damage of the base aluminum. Part failure can occur from corrosion due to loss of structural aluminum converted to corrosion product, pitting, a rough etched surface finish, and other strength reduction damage caused by corrosion.
Corrosion (Steel)	Typically, an electrochemical process that requires the simultaneous presence of iron (component of steel), moisture and oxygen. The iron is the reducing agent (gives up electrons) while the oxygen is the oxidizing agent (gains electrons). Iron or an iron alloy such as steel is oxidized in the presence of moisture and oxygen to produce rust. Corrosion is accelerated in the presence of salty water or acid rain. Part failure can occur from corrosion due to loss of structural steel converted to corrosion product, pitting, a rough etched surface finish and other strength reduction damage caused by corrosion.
Corrosion Product (Aluminum)	A white or dull gray powdery material that has an increased volume appearance (compared to non-corroded aluminum). Corrosion product is not to be confused with damage left in the base aluminum such as pits, worm holes, and etched surface finish.

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<b>Term</b>	<b>Definition</b>
Corrosion Product (Steel)	When iron or an iron alloy such as steel corrode, a corrosion product known as rust is formed. Rust is an iron oxide which is reddish in appearance and occupies approximately six times the volume of the original material. Rust is flakey and crumbly and has no structural integrity. Rust is permeable to air and water, therefore the interior metallic iron (steel) beneath a rust layer continues to corrode. Corrosion product is not to be confused with damage left in the base steel such as pits and etched surface finish.
Crack	Irregularly shaped separation within a material, sometimes visible as a narrow opening at the surface
Debond	Separation of two materials that were originally bonded together in a separate operation
Defect	An imperfection that affects safety or utility
Delamination	Internal separation of the layers of composite material
Dent	The permanent deflection of the cross section that is visible on both sides with no visible change in cross sectional thickness
Depression	Surface area where the material has been compressed but not removed
Distortion	Alteration of the original shape or size of a component
Edge Alignment	Distance from the blade centerline to the leading edge of the blade
Erosion	Gradual wearing away or deterioration due to action of the elements
Exposure	Leaving material open to action of the elements
Face	The surface of the blade that is directed toward the rear of the aircraft. The face side is the high pressure, or thrusting, side of the blade. The blade airfoil sections are normally cambered or curved such that the face side of the blade may be flat or even concave in the midblade and tip region.
Face Alignment	Distance from the blade centerline to the highest point on the face side perpendicular to the chord line
Feathering	The capability of blades to be rotated parallel to the relative wind, thus reducing aerodynamic drag
Fraying	A raveling or shredding of material
Fretting	Damage that develops when relative motion of small displacement takes place between contacting parts, wearing away the surface
Galling	To fret or wear away by friction
Gouge	Surface area where material has been removed

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<b>Term</b>	<b>Definition</b>
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
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

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Term	Definition
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
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. <u>Note:</u> Do not confuse <i>reference blade radius</i> with <i>blade station</i> ; 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

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

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## 14. Abbreviations (Rev.2)

Abbreviation	Term
AD	Airworthiness Directives
AMM	Aircraft Maintenance Manual
AOG	Aircraft on Ground
AR	As Required
ATA	Air Transport Association
CSU	Constant Speed Unit
FAA	Federal Aviation Administration
FH	Flight Hour
FM	Flight Manual
FMS	Flight Manual Supplement
Ft-Lb	Foot-Pound
HMI	Human Machine Interface
ICA	Instructions for Continued Airworthiness
ID	Inside Diameter
In-Lb	Inch-Pound
IPL	Illustrated Parts List
IPS	Inches Per Second
kPa	Kilopascals
Lb(s)	Pound(s)
Max.	Maximum
Min.	Minimum
MIL-X-XXX	Military Specification
MPI	Major Periodic Inspection (Overhaul)
MS	Military Standard
MSDS	Material Safety Data Sheet
N	Newtons
N/A	Not Applicable
NAS	National Aerospace Standards

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<b>Abbreviation</b>	<b>Term</b>
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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1. Description

- A. A propeller de-ice system removes ice that forms on blades by electrically heating the de-ice boots. The ice partially melts and is thrown from the blade by centrifugal force.
- B. A propeller anti-ice system is a system that prevents formation of ice on propeller surfaces. An anti-ice system dispenses a fluid that mixes with the moisture and decreases the temperature that will cause the moisture to freeze on the propeller blades. The mixture may then flow off the blades before it forms ice.

2. Components of an Electrical De-ice System

A. On/Off Switch

- (1) A de-ice system consists of one or more on/off switches. The pilot controls the operation of the de-ice system by turning on one or more switches. All de-ice systems have a master switch, and may have another toggle switch for each propeller. Some systems may also have a selector switch to adjust for light or heavy icing conditions or automatic switching for icing conditions.

B. Timer or Cycling Unit

- (1) The timer or cycling unit determines the sequence of which blades (or portion thereof) are currently being de-iced, and for what length of time. The cycling unit applies power to each de-ice boot or boot segment in a sequential or all on order.

C. Brush Block

- (1) A brush block, which is normally mounted on the engine just behind the propeller, is used to transfer electricity to the slip ring.

D. Slip Ring

- (1) The slip ring rotates with the propeller and provides a current path to the blade de-ice boots.

E. Slip Ring Wire Harness

- (1) A slip ring wire harness is used on some hub installations to electrically connect the slip ring to the terminal strip connection screw.

F. De-ice Wire Harness

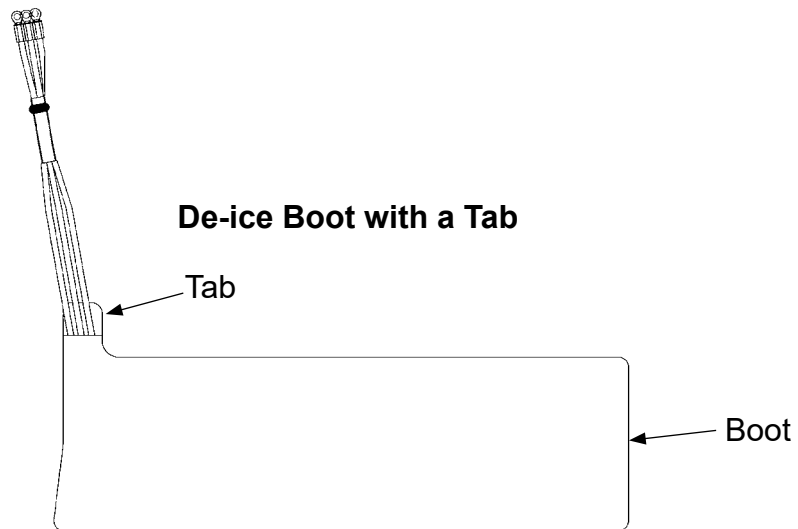
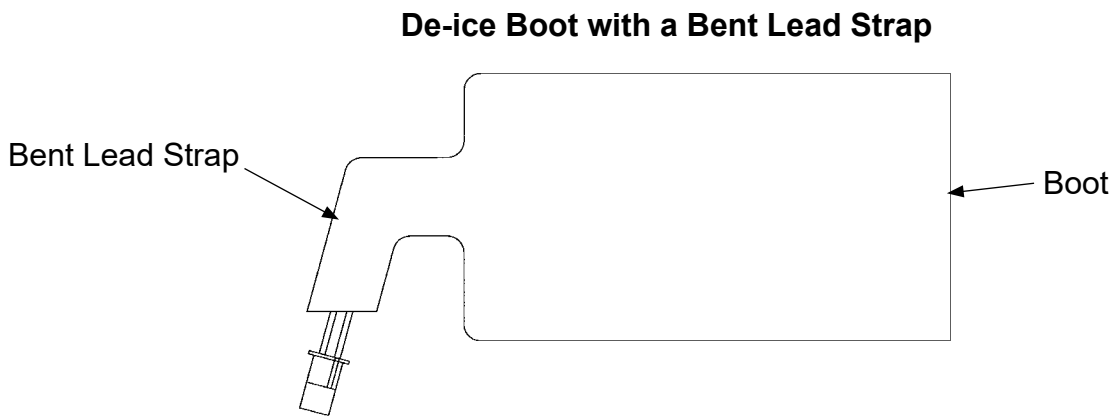
- (1) A de-ice wire harness is used to electrically connect the de-ice boot to the slip ring assembly.

G. Ammeter

- (1) An ammeter is used to indicate system current flow. The ammeter has an internal or external shunt.

H. Circuit Breaker or Switch

- (1) A switch or circuit breaker/switch is used to cut power in case of an overload.



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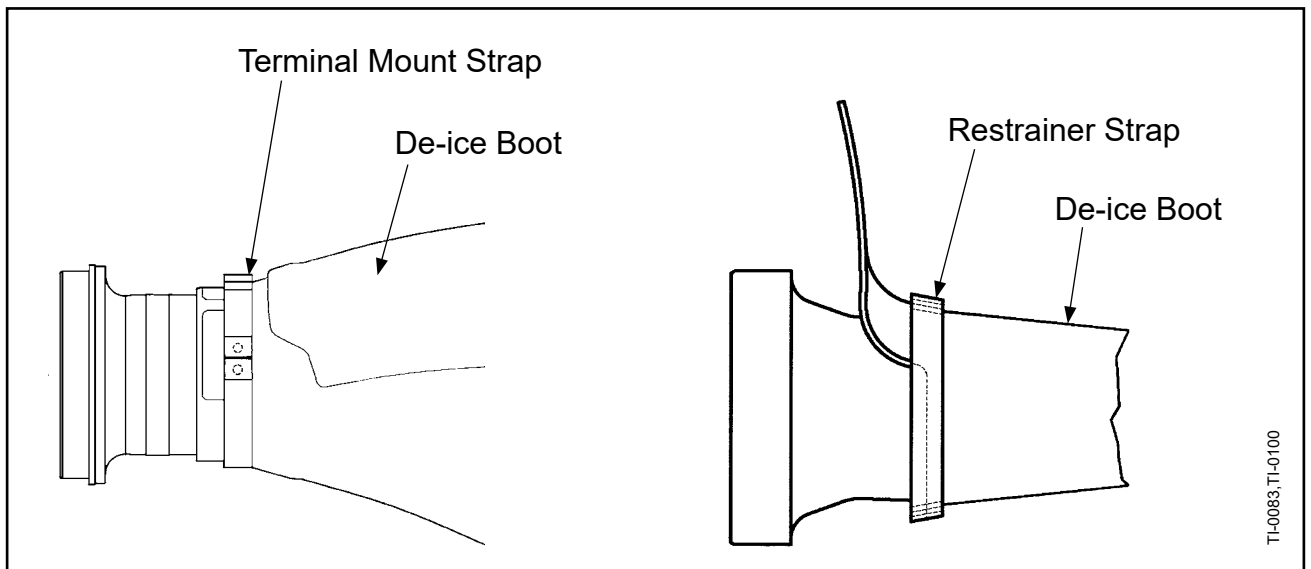
**De-ice Boots**  
**Figure 1**

**I. MOV**

- (1) A Metal Oxide Varistor is an electronic component transient suppression device with significant non-ohmic current-voltage characteristics.

**J. De-ice Boot**

- (1) A de-ice boot contains internal heating elements or dual elements. The boot is securely attached to the leading edge of each blade with adhesive.
  - (a) Lead Strap
    - 1 The thick cover over the de-ice boot lead wires that acts as an integral de-ice wire harness. Refer to Figure 1.
  - (b) Bent Lead Strap
    - 1 An extension of the boot rubber formed at an angle that routes the lead wire connection to the counterweight for secure bonding. Refer to Figure 1.
  - (c) Tab
    - 1 An extension of boot material under the de-ice boot lead wires. Refer to Figure 1.
  - (d) Restrainer Strap
    - 1 The strap at the inboard end of the boot that helps hold the boot in place on the blade. Refer to Figure 2.
  - (e) Terminal Mount Strap
    - 1 The strap on the shank of a composite blade that provides a connection between the de-ice boot lead wires, the de-ice wire harness, and the propeller de-ice system. Refer to Figure 2.



**Restrainer Strap and Terminal Mount Strap  
Figure 2**

3. Components of an Anti-ice System

A. Anti-icing Boot

- (1) The blade anti-icing boots are channeled rubber sheets that are securely attached to the leading edge of each blade with adhesive. The ridges in the anti-icing boot direct the fluid out onto the blades and permit for an even distribution of the anti-icing fluid across the blades.

B. Feed Tube

- (1) Feed tubes are installed on the propeller hub and adjusted to dispense fluid along the leading edge of the propeller anti-icing boots.

C. Fluid Tank

- (1) Reservoir for anti-ice fluid.

D. Pump

- (1) The pump supplies anti-ice fluid from the tank at a controlled rate. The anti-ice fluid is delivered through a filter, a check valve, and then through tubing to a slinger ring located at the rear of the spinner bulkhead.

E. Slinger Ring

- (1) The anti-ice fluid is dispensed into the rotating slinger ring, which holds the fluid in a curved channel by centrifugal force. The fluid then flows out of the slinger ring through feed tubes that are connected to the slinger ring, and then out onto the blade anti-icing boots.

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## 1. Removal of Propeller Ice Protection Components

### A. General

**CAUTION:** USE CAUTION WHEN REMOVING ICE PROTECTION COMPONENTS AND ICE PROTECTION ATTACHING HARDWARE TO AVOID DAMAGING THE PROPELLER.

- (1) Use the appropriate tools for removal of propeller ice protection components.

### B. Propeller Removal

- (1) As required, remove the propeller from the aircraft in accordance with the applicable propeller owner's manual or the Aircraft Maintenance Manual (AMM).

### C. Removal of De-ice and Anti-icing Boots

**WARNING:** DE-ICE AND ANTI-ICING BOOTS ARE TO BE REMOVED AND REPLACED AT EACH PROPELLER OVERHAUL. THIS IS REQUIRED REGARDLESS OF THE CONDITION OF THE DE-ICE OR ANTI-ICING BOOT.

- (1) Remove the de-ice or anti-icing boots in accordance with the applicable chapter in this manual:
  - (a) De-ice Boot Removal/Installation chapter
  - (b) Anti-icing Boot Removal/Installation chapter

### D. Removal of Propeller Ice Protection Components

**CAUTION:** DO NOT REMOVE THE FITTINGS FROM THE 107636 SLINGER RING ASSEMBLY UNLESS SPECIFIED IN THE COMPONENT INSPECTION CRITERIA.

- (1) Remove the ice protection components and attaching hardware.
- (2) Discard and replace the required ice protection components and attaching hardware in accordance with the applicable chapter in this manual:
  - (a) De-ice Kit Installation and Parts chapter
  - (b) Anti-icing Kit Installation and Parts chapter

### E. Removal of Air Frame Mounted Propeller Ice Protection Components

- (1) Remove the air frame mounted propeller ice protection components in accordance with this manual, the AMM or TC or STC holder's ICA.

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## 1. Important Information

**WARNING:** REMOVAL AND INSTALLATION OF A PROPELLER BLADE BOOT REQUIRES THE USE OF SOLVENTS, PAINTS, AND OTHER CHEMICALS THAT MAY BE HAZARDOUS. ALWAYS FOLLOW THE MANUFACTURER'S SAFETY PRECAUTIONS AND DISPOSAL REQUIREMENTS.

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

**CAUTION 2:** GRAPHITE ("LEAD") PENCIL MARKS WILL CAUSE CORROSION.

### A. General

- (1) This chapter contains the Hartzell Propeller approved procedures for:
  - (a) Removing and installing an anti-icing boot on a metal blade
  - (b) Removing and installing an anti-icing boot on a composite blade

### B. Personnel Requirements

- (1) Propeller disassembly and reassembly may only be performed by qualified personnel at an appropriately licensed propeller repair facility.
- (2) Replacement of a propeller blade boot on an assembled propeller may be performed by qualified personnel with sufficient training and certifications (when required by the applicable Aviation Authority) to accomplish the work required in a safe and airworthy manner.

**CAUTION:** DO NOT INSTALL A CRACKED, DELAMINATED, OR DAMAGED ANTI-ICING BOOT ON A BLADE .

### C. Read Before Removing/Installing an Anti-icing Boot

- (1) Before installing an anti-icing boot on a blade, examine the boot for cracking, delamination, or other damage.
  - (a) An anti-icing boot has no stated storage shelf life limit. The condition of the boot determines if it may be installed on a blade.
- (2) When an anti-icing boot is replaced on a propeller blade while installed in the hub, position the propeller blade to prevent the contamination of other propeller components.
- (3) Balancing of the propeller assembly is recommended after an anti-icing boot is replaced on a propeller blade. Refer to the applicable Aircraft Maintenance Manual and the Hartzell Propeller Standard Practices Manual 202A (61-01-02).

- (4) When using Methyl Propyl Ketone (MPK) CM219, the dry time and the time required after adhesive reactivation for the adhesive to become slightly sticky to the touch is significantly longer than when using Methyl Ethyl Ketone (MEK) CM106.
- (5) Anti-icing boots have two distinctly different sides.
  - (a) The bond-side is the textured side on which the adhesive is applied and is toward the blade surface.
  - (b) The breeze-side is the smooth side away from the surface of the blade and adhesive is not applied on this side.

## 2. Paint Mixtures

### A. Mixture Number 3 - Wash Primer

<u>CM Number</u>	<u>Description</u>	<u>Quantity</u>
CM24	Wash Primer	4 parts
CM25	Reducer, Wash Primer	4 parts
CM26	Acid Diluent	1 part
Let stand for 30 minutes before using		

### B. Mixture Number 5

<u>CM Number</u>	<u>Description</u>	<u>Quantity</u>
CM33	Paint, Polane® Black	6 parts
CM30	Catalyst	1 part
CM32	Polane Reducer	1-3 parts (as required to achieve desired dry thickness)
CM31	Accelerator	as needed

### 3. Anti-icing Boot Removal

#### A. Before Removing the Boot:

- (1) When the boot is to be replaced other than at an overhaul:
  - (a) Make a record of the currently installed anti-icing boot part number and compare it to the part number listed in Hartzell Propeller Application Guide Manual 159 (61-02-59), to confirm that the correct replacement boot is used.
    - 1 Refer to Hartzell Propeller Service Letters HC-SL-30-260 for additional approved anti-icing boots manufactured by Hartzell Propeller LLC.
- (2) When the boot is to be replaced at overhaul:
  - (a) Identify the part number of the anti-icing boot for the application. Refer to Hartzell Propeller Application Guide Manual 159 (61-02-59).
    - 1 Refer to Hartzell Propeller Service Letters HC-SL-30-260 for additional approved anti-icing boots manufactured by Hartzell Propeller LLC.

B. Metal Blades: Boot Removal

- (1) Remove and replace each anti-icing boot at every propeller overhaul.

**CAUTION:** DO NOT DAMAGE THE BLADE DURING REMOVAL OF THE ANTI-ICE BOOT. IF THE BLADE IS DAMAGED, THE BLADE MUST BE REPAIRED IN ACCORDANCE WITH THE APPLICABLE HARTZELL PROPELLER OWNER'S MANUAL OR HARTZELL PROPELLER ALUMINUM BLADE OVERHAUL MANUAL 133C (61-13-33).

- (2) There are three methods for removing a boot from a metal blade.

**CAUTION:** BEARINGS, COUNTERWEIGHTS, ETC. MUST BE REMOVED FROM THE BLADE WHEN USING METHOD 1.

- (a) Method 1 - Applicable for a disassembled propeller (at overhaul)

**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.

- 1 Submerge the aluminum blade and boot in a vapor de-greaser or strong solvent (toluene CM41, MEK CM106, or MPK CM219).
- 2 Using a nonmetallic scraper, scrape the boot away from the blade.
- 3 Using either a solvent soak of toluene CM41, MEK CM106, or MPK CM219 or plastic media cleaning, remove any remaining adhesive residue and filler, if applicable, from the blade.



- (b) Method 2 - Applicable for a disassembled or assembled propeller

**CAUTION:** APPLY MASKING MATERIAL TO THE HUB OR CLAMP TO PREVENT CONTAMINATION OF OTHER PROPELLER COMPONENTS.

- 1 When replacing a boot on an assembled propeller, position the propeller blade being repaired to prevent the contamination of other propeller components.
  - a Apply masking material to the hub or clamp to prevent contamination of other propeller components.
- 2 Liberally apply toluene CM41, MEK CM106, or MPK CM219 to loosen a corner of the boot.
- 3 Repeat the application of solvent and permit to soak for a few minutes.
- 4 Using a nonmetallic scraper, raise the loosened corner of the boot.
- 5 Using pliers, grasp the raised edge of the boot and apply a steady pull.
- 6 Continue applying toluene CM41, MEK CM106, or MPK CM219 along the point of contact between the boot and the blade to loosen the adhesive bond.
- 7 Use a steady pull to remove the boot.
- 8 Remove any remaining adhesive residue and filler, if applicable.
  - a For a disassembled blade, use a solvent soak of toluene CM41, MEK CM106, or MPK CM219 or plastic media cleaning.
  - b For an assembled blade, use a solvent soak of toluene CM41, MEK CM106, or MPK CM219.

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- (c) Method 3 - Applicable for a disassembled or assembled propeller

**CAUTION:** USE CAUTION TO PREVENT THE OSCILLATING TOOL FROM DAMAGING THE BLADE.

- 1** Using a locally procured oscillating tool with a scraper blade, remove the boot.

**NOTE:** A higher amperage tool is more effective for removal of the boot.

- a** Start at a sealed edge.
- b** Keeping the scraper blade flat against the blade, slowly slide the scraper blade under the boot.
- c** Remove any remaining adhesive residue and filler, if applicable.
  - (1)** For a disassembled blade, use a solvent soak of toluene CM41, MEK CM106, or MPK CM219 or plastic media cleaning.
  - (2)** For an assembled blade, use a solvent soak of toluene CM41, MEK CM106, or MPK CM219.
- d** Examine the blade for damage in accordance with the applicable propeller owner's manual.
  - (1)** Repair damage in accordance with the applicable propeller owner's manual or Hartzell Propeller Aluminum Blade Overhaul Manual 133C (61-13-33).

C. Composite Blades: Boot Removal

- (1) Two procedures are approved for removal.
  - (a) Procedure 1 (preferred) causes minimal damage to the paint finish. If successfully followed, the blade should not require refinishing.
  - (b) Procedure 2 requires mandatory refinishing of the blade surface. Procedure 2 is the ideal method for removal at overhaul because all of the paint must be removed from the blade at overhaul.
  - (c) The two procedures may be combined.

(2) Removal Procedure 1

**WARNING:** MEK CM106, MPK CM219, AND TOLUENE CM41 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.

**CAUTION:** IN THE FOLLOWING PROCEDURES, USE EXTREME CARE NOT TO CUT INTO THE COMPOSITE MATERIAL. **NEVER** SUBMERSE A BLADE IN A SOLVENT SOLUTION TO REMOVE AN ANTI-ICE BOOT.

- (a) Using a clean lint-free cloth dampened with solvent MEK CM106, MPK CM219, or toluene CM41, clean completely around the edges of the boot.

**NOTE:** This will assist in loosening the edges of the boot before removal.

- (b) Starting at the inboard end of the boot, use a razor blade to carefully cut the paint sealer around the entire boot.

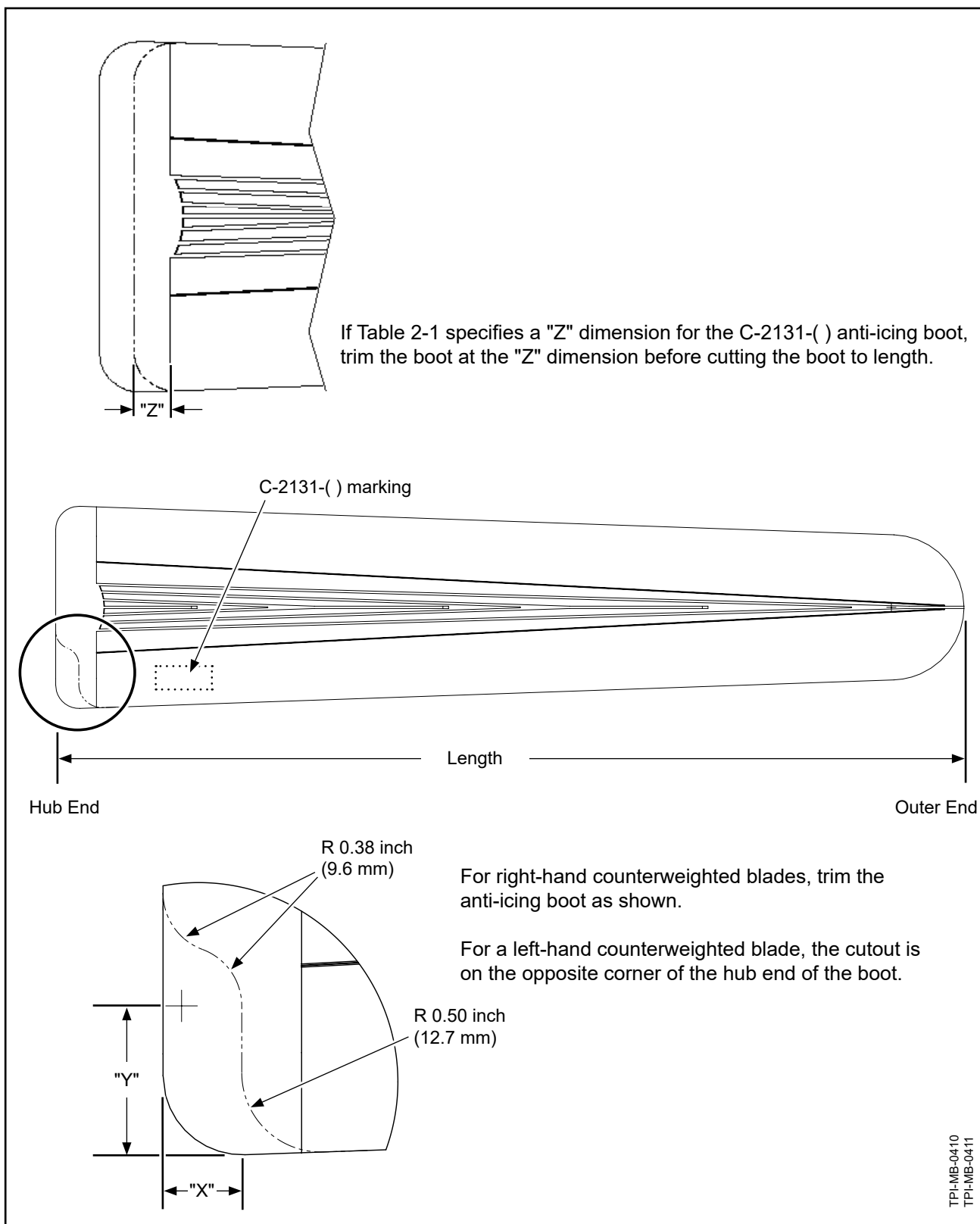
1 Lift the edges of the boot to expose the adhesive CM10 between the boot and the blade. Repeat step 3.C.(2)(a) and permit to soak for a few minutes.

2 Using a clean lint-free cloth dampened with solvent MEK CM106, MPK CM219, or toluene CM41, clean completely around the edges of the boot and permit to soak for a few minutes.

- (c) With a paint brush or equivalent, brush the solvent MEK CM106, MPK CM219, or toluene CM41 to loosen a corner of the inboard edge of the boot.
- (d) Using vice grips or a similar tool, grasp the corner of the boot.

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- (e) Steadily pull the boot from the blade while continuing to brush the solvent MEK CM106, MPK CM219, or toluene CM41 into the adhesive bond line.
  - (f) Using a clean lint-free cloth dampened with solvent MEK CM106, MPK CM219, or toluene CM41, remove excess adhesive from the blade.
    - 1 A cloth, saturated with solvent MEK CM106, MPK CM219, or toluene CM41, put over the boot or terminal mount strap area for 5-10 minutes, is an effective method to soften the adhesive remaining on the blade.
    - 2 To minimize the evaporation of the solvent, wrap the blade in plastic.
  - (g) Perform a coin-tap inspection on the erosion shield.
    - 1 Repair debonded areas, or replace the erosion shield, as required, in accordance with the Check, Minor Repair, and Major Repair chapters of Hartzell Propeller Composite Blade Maintenance Manual 135F (61-13-35).
  - (h) Where the boot will cover the blade, if the amount of exposed blade is more than 20% of the normally painted area, refinish the blade in accordance with Hartzell Propeller Composite Blade Manual 135F (61-13-35).
- (3) Removal Procedure 2
- (a) Starting at one end of the boot, use a razor blade scraper to cut the adhesive between the boot and the blade while pulling the boot or terminal mount strap away from the blade.
  - (b) After the boot is removed, use a vibratory sander with no coarser than 60 grit sandpaper to remove all remaining adhesive, filler, and paint sealer in the boot area.
  - (c) Perform a Coin-tap inspection of the erosion shield.
    - 1 Repair debonded areas, or replace the erosion shield, as required, in accordance with the Check, Minor Repair, and Major Repair chapters of Hartzell Propeller Composite Blade Maintenance Manual 135F (61-13-35).
  - (d) Refinish the area in accordance with the Finish Procedures chapter of Hartzell Propeller Composite Blade Maintenance Manual 135F (61-13-35).



**C-2131-() Anti-icing Boot: "X", "Y", and "Z" Dimensions**  
**Figure 2-1**

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<b>Boot Part Number</b>	<b>Length</b>	<b>"X" Dimension (Refer to Figure 2-1)</b>	<b>"Y" Dimension (Refer to Figure 2-1)</b>	<b>"Z" Dimension (Refer to Figure 2-1)</b>
C-2131	16.500 ± 0.125 inches (419.10 ± 3.17 mm)	0.093 ± 0.063 inch (2.36 ± 1.60 mm)	1.03 inch (26.16 mm)	-
C-2131-1	15.500 ± 0.125 inches (393.70 ± 3.17 mm)	0.375 ± 0.063 inch (9.52 ± 1.60 mm)	0.94 inch (23.87 mm)	-
C-2131-2	19.500 ± 0.125 inches (495.30 ± 3.17 mm)	0.63 ± 0.063 inch (16.0 ± 1.60 mm)	0.94 inch (23.87 mm)	-
C-2131-3(L) Refer to Note	9.000 ± 0.125 inches (228.60 ± 3.17 mm)	0.63 ± 0.063 inch (16.0 ± 1.60 mm)	0.94 inch (23.87 mm)	-
C-2131-4	11.625 ± 0.125 inches (295.27 ± 3.17 mm)	0.63 ± 0.063 inch (16.0 ± 1.60 mm)	0.94 inch (23.87 mm)	-
C-2131-5	8.250 ± 0.125 inches (209.55 ± 3.17 mm)	0.250 ± 0.063 inch (6.35 ± 1.60 mm)	1.03 inch (26.16 mm)	-
C-2131-6	10.875 ± 0.125 inches (276.22 ± 3.17 mm)	0.250 ± 0.063 inch (6.35 ± 1.60 mm)	1.03 inch (26.16 mm)	-
C-2131-7	14.500 ± 0.125 inches (368.30 ± 3.17 mm)	-	-	-
C-2131-8	11.812 ± 0.125 inches (300.02 ± 3.17 mm)	-	-	-
C-2131-9	15.125 ± 0.125 inches (384.17 ± 3.17 mm)	-	-	-
C-2131-10	12.000 ± 0.125 inches (304.80 ± 3.17 mm)	-	-	-
C-2131-11	12.750 ± 0.125 inches (323.85 ± 3.17 mm)	-	-	-
C-2131-12	13.500 ± 0.125 inches (342.90 ± 3.17 mm)	-	-	-
C-2131-13	16.500 ± 0.125 inches (419.10 ± 3.17 mm)	-	-	-
C-2131-14	6.000 ± 0.125 inches (152.40 ± 3.17 mm)	-	-	-
C-2131-15	15.063 ± 0.125 inches (382.60 ± 3.17 mm)	-	-	0.50 ± 0.060 inch (12.7 ± 1.52 mm)
C-2131-16	17.625 ± 0.125 inches (447.67 ± 3.17 mm)	-	-	-
C-2131-17	16.875 ± 0.125 inches (428.62 ± 3.17 mm)	-	-	0.50 ± 0.060 inch (12.7 ± 1.52 mm)
<b>NOTE:</b> The "L" designates a left hand anti-icing boot. A left hand anti-icing boot is a mirror image of a right hand anti-icing boot. Refer to Figure 2-1.				

**Anti-icing Boot - Length, "X", "Y", and "Z" Dimensions  
Table 2-1**

4. Before Installing the Anti-icing Boot

A. Determine the Correct Boot for the Application

- (1) To determine the correct anti-icing boot for the application, refer to the Hartzell Propeller Application Guide Manual 159 (61-02-59).
  - (a) Refer to Hartzell Propeller Service Letters HC-SL-30-260 for additional approved anti-icing boots manufactured by Hartzell Propeller LLC.

B. C-2131-( ) Anti-icing Boots Only:

- (1) The Hartzell Propeller part number 102155 anti-icing boot can be modified to make any C-2131-( ) anti-icing boot.
  - (a) The Hartzell Propeller part number 102155 anti-icing boot is the raw material that can be cut to length in accordance with Table 2-1 to make any C-2131-( ) anti-icing boot.
  - (b) The 102155 anti-icing boot is 19.50 inches (495.3 mm) long with an "X" dimension of 0.000 inch (0.00 mm).
  - (c) The 102155 anti-icing boot is identified as "C-2131-( )" on the breeze-side as shown in Figure 2-1. The new part number will be completed after the anti-icing boot is cut to size.
- (2) One C-2131-( ) anti-icing boot may be used to make another C-2131-( ) anti-icing boot, if the original C-2131-( ) anti-icing boot is longer than the final C-2131-( ) anti-icing boot.

NOTE: For example, a C-2131-1 anti-icing boot that is 15.500 inches (393.70 mm) long may be used to make a C-2131-6 anti-icing boot that is 10.875 inches (276.22 mm) long

- (3) If Table 2-1 specifies a "Z" dimension for the C-2131-( ) anti-icing boot, trim the boot at the "Z" dimension before cutting the boot to length.
- (4) Cut the outer end of the anti-icing boot to the length specified in Table 2-1.
  - (a) Cut the outer end of the anti-icing boot to a full radius tangent with the cut end and both sides.
  - (b) If not already accomplished, cut the inboard corners to a 0.5 inch (12 mm) radius.

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

(5) Using white opaque ink CM69, or equivalent, identify the anti-icing boot with the appropriate part number.

(a) For the Hartzell Propeller part number 102155 anti-icing boot, complete the C-2131-( ) number in the blank area of the label to match the anti-icing boot part number to be installed.

(b) When using one Hartzell Propeller part number C-2131-( ) anti-icing boot to make another C-2131-( ) anti-icing boot, change the C-2131-( ) part number to match the anti-icing boot part number to be installed.

**C. Blade Surface Preparation**

**WARNING:** IF REQUIRED, APPLY A LAYER OF POLANE PAINT BEFORE INSTALLING AN ANTI-ICING BOOT. BLADES WITH INCORRECTLY PAINTED SURFACES OR SURFACES WITH NO PAINT PROTECTION ARE LIKELY TO DEVELOP CORROSION BENEATH THE BOOT AND MAY HAVE DECREASED ADHESION STRENGTH.

(1) Install an anti-icing boot only on a surface that has a layer of Polane paint.

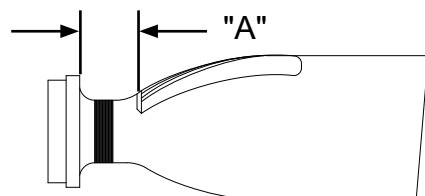
(2) If paint was removed from the blade surface during boot removal process:

(a) Refinish and paint the area in accordance with the applicable Hartzell Propeller owner's manual or Hartzell Propeller Aluminum Blade Manual 133C (61-13-33).

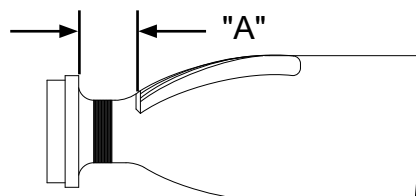
**CAUTION:** DO NOT INSTALL THE BOOT UNTIL THE PAINT HAS CURED FOR A MINIMUM OF EIGHT HOURS.

(b) Cure the paint for a minimum of eight hours before beginning the boot installation procedure.

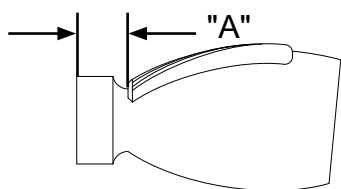




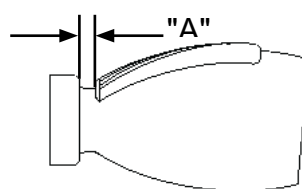
D Shank  
"B" = 2.063 inch  
(52.40 mm)



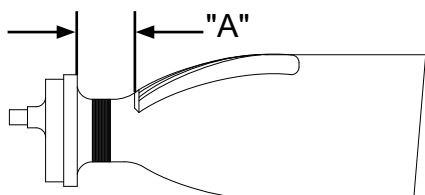
E Shank - Metal Blade Only  
"B" = 1.898 inch  
(48.21 mm)



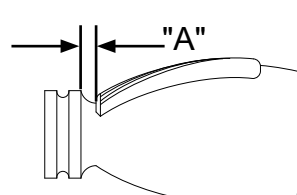
MV Shank  
"B" = 1.546 inch  
(39.26 mm)



M, T, W, and Z, Shank,  
8447, 10151, and 10152 blades  
"B" = 0.325 inch  
(8.26 mm)



Y Shank  
"B" = 2.063 inch  
(52.40 mm)

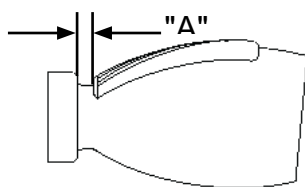


X and V Shank  
"B" = 0.190 inch  
(4.83 mm)

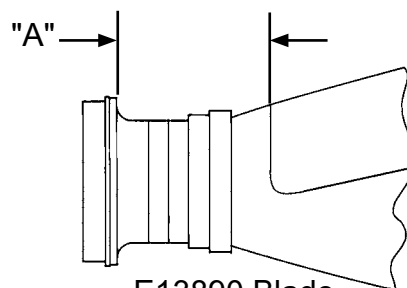
The illustrations above refer to the "A" dimension given in Table 2-2 for boot installation on a blade outside the hub.

For an assembled propeller, subtract the "B" dimension from the "A" dimension to locate the "C" dimension that is the corrected boot location from the outermost surface of the hub, counterweight clamp, or blade clamp, as applicable.

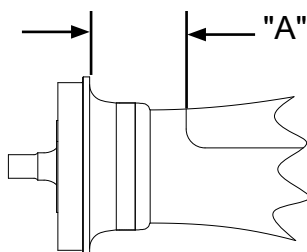
**Anti-icing Boot Location ("A", "B", and "C" Dimension) for Metal Blades**  
**Figure 2-2**



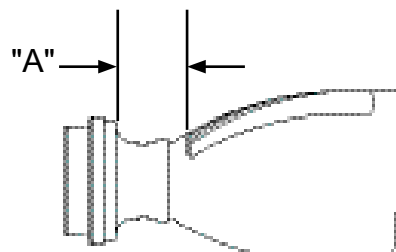
**M and LM Shanks**  
"B" = 0.325 inch (8.26 mm)



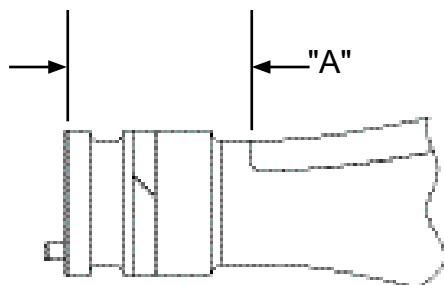
**E13890 Blade**  
"B" = 1.898 inches (48.20 mm)



**"N" Shank**  
"B" = 1.898 inches (48.20 mm)

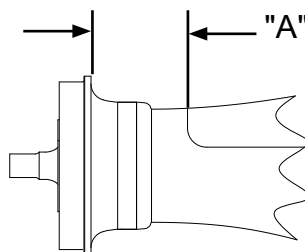


**"A" and "E" Shanks and  
7890 Blades**  
"B" = "A" as specified in Table 2-2



**Bantam "A" Shank**  
3 and 5-blade Propellers:  
"B" = 1.886 inches (47.90 mm)

2-blade Propellers:  
"B" = 1.918 inches (48.71 mm)



**Raptor "C" Shank**  
"B" = 1.685 inch (42.80 mm)

**Raptor "D" Shank**  
"B" = 1.670 inch (42.41 mm)

The illustrations above refer to the "A" dimension given in Table 2-2 for boot installation on a blade outside the hub.

For an assembled propeller, subtract the "B" dimension from the "A" dimension to locate the "C" dimension that is the corrected boot location from the outermost surface of the hub, counterweight clamp, or blade clamp, as applicable.

**Anti-icing Boot Location ("A", "B", and "C" Dimension) for Composite Blades**  
**Figure 2-3**

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<b>Blade</b>	<b>"A" Dimension - (Inches) Uninstalled Blade</b>	<b>Blade</b>	<b>"A" Dimension - (Inches) Uninstalled Blade</b>
76C04B-0.6	2 1/8	FC8468B-3	3 3/16
10151B-8	13/32	FC8475B-6*1	3 1/2
10151NB-8	13/32	FJC7497DB	3 1/2
10152NB-5.5	1	GC11114B-2	4
C75A01B	4	GC11115B-2	3 3/8
C75A01B*1	4	MV8433NB-2R	2 5/16
D9511FSB	4 3/16	MV8433NB-4R	2 3/16
E9111B	4 3/16	MV8833NB	2 3/16
FC7497DB	3 1/2	N7605B	2 3/8
F7663DRB	2 9/16	N7605B*1	2 3/8
F7693DFB	2 9/16	N7605B*2	2 3/8
F7693DFB*1	2 9/16	N7605B*3	2 3/8
F7693DFB*2	2 9/16	N7605B-2	2 3/8
F7693DFB*3	2 9/16	N7605CB	2 3/8
F7693DFB*4	2 9/16	N7605CB*1	2 3/8
F7693DFB*5	2 9/16	N7605CB*2	2 3/8
F7693DFB*6	2 9/16	N7605CB-2	2 3/8
F7693DFB*7	2 9/16	N7605CK+2	2 5/8
F7693DFB-2	2 13/16	NC9405B	3 3/8
F7693FB	2 1/4	NC9405B*1	3 3/8
F7694B	2 1/4	NM8410B-4	2 3/8
F7694B*1	2 9/16	R10152B-5.5	1
FC7391DB*1	3 1/2	R10152NB-5.5	1
FC7663B-2R*3	3 1/2	T10890CNB-2	1 1/2
FC7663B-2R*4	3 1/2	W10151B-10R*2	13/32
FC7663DB-4T	3 1/2	W10151NB-10R	13/32
FC7666CB-4	3 13/16	W10152NB-5.5	1
FC8465B-6	3 1/2		

**Anti-Icing Boot - "A" Dimension  
Table 2-2**

**D. Determine the Boot Location on the Blade**

- (1) Use the applicable Figure to determine the location of Dimension "A".
  - (a) Metal blades: Refer to Figure 2-2 for blade shank illustrations showing the location of Dimension "A".
  - (b) Composite blades: Refer to Figure 2-3 for blade shank illustrations showing the location of Dimension "A".
- (2) For a blade that is not installed in the hub, mark the distance to the inboard edge of the boot (Dimension "A") on the leading edge of the blade.
  - (a) Use Table 2-2 to determine the specific Dimension "A" for the blade configuration.
  - (b) The boot location (Dimension "A") has a tolerance of  $\pm 0.062$  inch (1.58 mm).
- (3) For a blade that is installed in the hub, mark the distance from the hub or blade clamp to the inboard edge of the boot (Dimension "C") on the leading edge of the blade.
  - (a) Use Table 2-2 to determine the specific Dimension "A" and Dimension "B" for the blade configuration.
    - 1 The boot location ("A" or "B" dimension) has a tolerance of  $\pm 0.062$  inch (1.58 mm).
  - (b) Calculate Dimension "C" by subtracting Dimension "B" from Dimension "A" (example: Dimension "A" - Dimension "B" = Dimension "C")

## 5. Installing an Anti-icing Boot on a Metal Blade

### A. Blade/Boot Preparation

**CAUTION:** CLEANLINESS IS NECESSARY FOR PROPER ANTI-ICING BOOT ADHESION. ALL SOLVENTS MUST BE FREE OF CONTAMINANTS. BRUSHES AND CLOTHS MUST BE CLEAN AND LINT FREE. DO NOT TOUCH SURFACES AFTER THEY HAVE BEEN PREPARED FOR THE ANTI-ICING BOOT INSTALLATION.

- (1) If blade is not installed in the hub:
  - (a) For Y, D, and E shank blades, apply masking material to the blade seal or Teflon® area.
  - (b) For all other blades, apply masking material to the retention radius.
- (2) Locate the leading edge by sighting up the leading edge from the blade tip to the blade shank.
  - (a) Using a crayon or a soft non-graphite pencil CM162 or equivalent, make a centerline mark on the blade shank in line with the leading edge centerline.
- (3) Put the anti-icing boot on the blade so that the centerline of the boot is aligned with the blade shank and leading edge center lines.
  - (a) Make marks on the breeze (exposed) side on the inboard and outboard edges of the boot that show the centerline.

**NOTE:** The center rib of the anti-icing boot can be used as the centerline.

- (b) Using a straight edge, connect the marks at the inboard and outboard edges of the boot on the breeze (exposed) side to show the centerline.

**CAUTION:** DO NOT REMOVE MORE MATERIAL THAN IS NECESSARY FOR CLEARANCE AROUND THE COUNTERWEIGHT KNOB.

- (4) For blades with a counterweight knob, mark the "X" dimension on the boot. Refer to Table 2-1.
  - (a) Mark on the anti-icing boot indicating the cutout area in accordance with the shape shown in Figure 2-1.
  - (b) Cut out the designated area.
- (5) Put the boot on the blade with the inboard edge of the boot aligned with the "A" or "C" dimension mark.
  - (a) Refer to the section, "Determine the Boot Location on the Blade" in this chapter to determine the correct "A" or "C" dimension.
- (6) Center the boot on the centerline between the leading edge of the blade and the blade shank.
  - (a) Be sure the boot clears the counterweight knob, if applicable.
  - (b) Fold the boot over the blade and hold it in position.

- (7) Using a non-graphite pencil, mark a line approximately 0.5 inch (12 mm) away from the anti-icing boot around the entire perimeter, except at the shank. Refer to Figure 2-4.
- (8) Remove the anti-icing boot.
- (9) Apply masking material to the area outside of the marking.

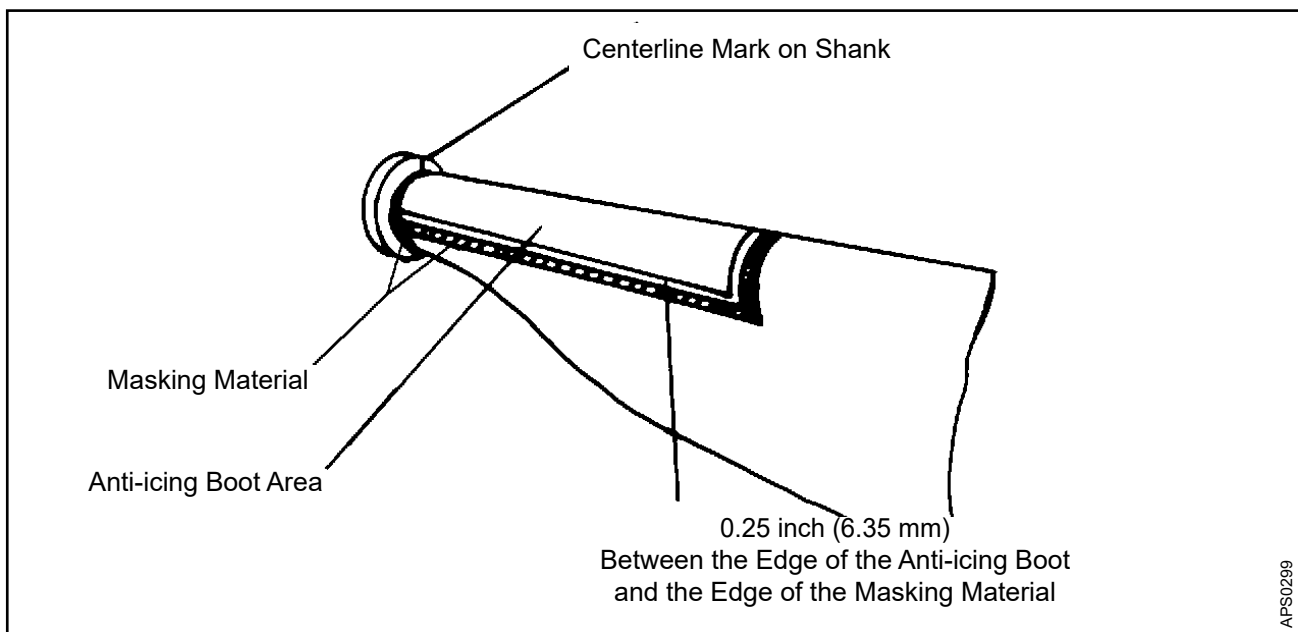
**CAUTION:** DO NOT EXPOSE THE BASE METAL OF THE BLADE.

- (10) If the blade has been painted with metallic paint, before cleaning lightly sand the area where the anti-icing boot will be installed, using 150 grit sandpaper.

**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:** USE ONLY SOLVENT MEK CM106, MPK CM219, OR TOLUENE CM41 BECAUSE OTHER CLEANING SOLVENTS MAY ADVERSELY AFFECT PAINTED SURFACES.

- (11) Using solvent MEK CM106, MPK CM219, or toluene CM41, clean the area bounded by the masking material.
- (12) Permit the surface to dry, or using a clean, lint-free cloth, wipe the surface dry.



**Masking Anti-icing Boot Location on the Blade  
Figure 2-4**

B. Adhesive Application

**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:** THE BLADE AND ANTI-ICING BOOT CONTACTING SURFACES TO BE BONDED MUST BE THOROUGHLY AND COMPLETELY COVERED WITH ADHESIVE. TWO LAYERS OF ADHESIVE ARE REQUIRED. DO NOT APPLY ADHESIVE OR INSTALL THE BOOT IF THE RELATIVE HUMIDITY IS ABOVE 90% OR IF THE TEMPERATURE IS BELOW 50° F (10° C). FOR BEST RESULTS, APPLY ADHESIVE AND PERFORM ANTI-ICING BOOT INSTALLATION AT TEMPERATURES BETWEEN 65-75°F (19-23°C), WITH RELATIVE HUMIDITY EQUAL TO OR LESS THAN 90%. CURING TIMES VARY WITH TEMPERATURE AND RELATIVE HUMIDITY. IF RELATIVE HUMIDITY IS BETWEEN 75-90%, PERMIT ADDITIONAL CURING TIME. WHEN ADHESIVE IS APPLIED AT TEMPERATURES BELOW 65°F (19° C), THE BOND STRENGTH IS DIMINISHED REGARDLESS OF THE LENGTH OF CURING TIME.

- (1) Verify that the correct boot is being installed. Refer to Hartzell Propeller Application Guide Manual 159 (61-02-59).
  - (a) Refer to Hartzell Propeller Service Letters HC-SL-30-260 for additional approved anti-icing boots manufactured by Hartzell Propeller LLC.
- (2) Using solvent MEK CM106, MPK CM219, or toluene CM41, moisten a clean, lint-free cloth.
- (3) Clean the bond side of the boot changing the side of the cloth frequently to avoid contamination of the surface.
- (4) Permit the surface to air dry.

**CAUTION:** DO NOT INSTALL THE BOOT UNTIL THE PAINT HAS CURED FOR A MINIMUM OF EIGHT HOURS.

- (5) Cure the paint for a minimum of eight hours before beginning the anti-icing boot installation procedure.

- (6) There are three different adhesive options available for anti-icing boot installation.
- (a) Adhesive Application, Option A
- 1 Mix adhesive CM10 thoroughly
  - 2 Apply one even layer of adhesive CM10 to the boot and to the masked area of the blade where the boot will be installed.
  - 3 Permit the adhesive CM10 to dry a minimum of one hour.
  - 4 Apply a second even layer of adhesive CM10 to the boot and to the masked area of the blade where the first layer of the adhesive mixture was applied.
  - 5 Permit the surfaces to dry until the adhesive is slightly sticky to the touch (as if touching the glue-side of masking tape).
- (b) Adhesive Application, Option B
- 1 Stir primer CM57 thoroughly.
  - 2 Apply one even layer of primer CM57 to the masked area of the blade where the boot will be installed.
  - 3 Permit the primer CM57 to air dry for a minimum of one hour before applying the adhesive mixture.

**CAUTION:** THOROUGHLY STIR ADHESIVE CURING AGENT BEFORE MIXING IT WITH THE ADHESIVE BECAUSE THE INGREDIENTS OF THE CURING AGENT MAY HAVE SEPARATED.

- 4 Mixing Instructions for CM114-1
  - (1) Mix 9 parts adhesive CM79 with 1 part adhesive curing agent CM114-1 by volume. Thoroughly mix until a consistent color tone is present.
- 5 Mixing Instructions for CM114-2
  - (1) Mix 2 parts curing agent CM114-2 to 100 parts adhesive CM79 by weight. Thoroughly mix until a consistent color tone is present.
- 6 Apply one even layer of the adhesive mixture to the bond-side of the boot and to the masked area of the blade where primer CM57 was applied.
- 7 Permit the adhesive mixture to air dry for a minimum of one hour.



8 Apply a second layer of the adhesive mixture to the bond-side of the boot and to the masked area of the blade where the first layer of the adhesive mixture was applied.

9 Permit the surfaces to dry until the adhesive is slightly sticky to the touch (as if touching the glue-side of masking tape).

(c) Adhesive Application, Option C

1 Stir primer CM216 thoroughly.

2 Apply one even layer of primer CM216 to the masked area of the blade where the boot will be installed.

3 Permit the primer CM216 to air dry for a minimum of one hour before applying the adhesive mixture.

**CAUTION: THOROUGHLY SHAKE THE CONTAINER OF ADHESIVE CURING AGENT CM218 BEFORE MIXING IT WITH THE ADHESIVE BECAUSE THE INGREDIENTS OF THE CURING AGENT MAY HAVE SEPARATED.**

4 Mix adhesive CM217 with the adhesive curing agent CM218 in accordance with the manufacturer's technical data sheet. Thoroughly mix until a consistent color tone is present.

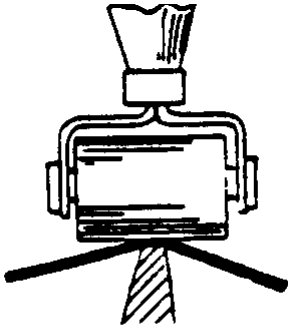
5 Apply one even layer of the adhesive mixture to the bond-side of the boot and to the masked area of the blade where primer CM216 was applied.

6 Permit the adhesive mixture to air dry for a minimum of one hour.

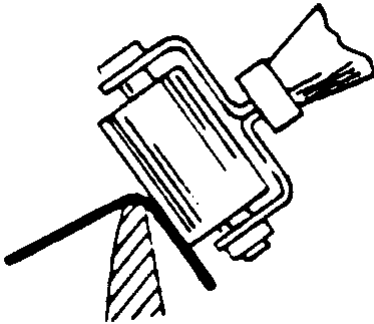
7 Apply a second layer of the adhesive mixture to the bond-side of the boot and to the masked area of the blade where the first layer of the adhesive mixture was applied.

8 Permit the surfaces to dry until the adhesive is slightly sticky to the touch (as if touching the glue-side of masking tape).

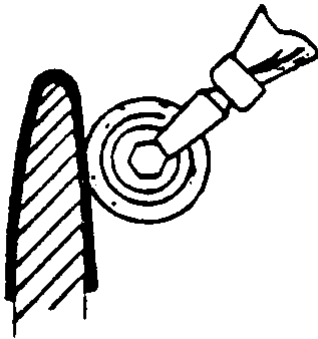
9 Tack life is 10 to 20 minutes.



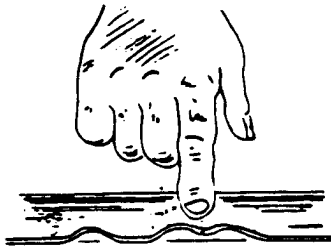
Step 1 Roll firmly along the centerline with a rubber or silicon roller.



Step 2 Gradually tilt the roller and carefully work the anti-icing boot over each side of the blade contour.



Step 3 Roll outward from the centerline to the edges.



Step 4 If excess material at the edges puckers, work out smoothly and carefully with fingers

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**Rolling the Anti-icing Boot onto a Metal Blade**  
**Figure 2-5**

### C. Anti-icing Boot Installation

**CAUTION:** THE BONDING SURFACES MUST BE THOROUGHLY COVERED WITH ADHESIVE. TWO LAYERS OF ADHESIVE ARE REQUIRED.

- (1) When the adhesive layers are sticky to the touch, begin putting the boot on the shank end of the blade.
  - (a) Line up the inboard end of the boot with the "A" or "C" dimension reference line and the centerline mark on the blade.
  - (b) Working outward toward the tip of the blade, tack the boot centerline to the leading edge of the blade. If the centerline gets out of alignment, pull up with a quick motion and reapply the boot.
  - (c) If the adhesive is removed from either surface, completely remove the boot and reapply adhesive in accordance with steps 5.B.(6) in this chapter.
  - (d) When using Adhesive Application, Option A or Option B: if the surface becomes too dry, the adhesive may be reactivated by lightly applying solvent MEK CM106, Toluene CM41, acetone CM11, or MPK CM219 to the adhesive.

**CAUTION:** DO NOT REACTIVATE THE ADHESIVE WHEN USING ADHESIVE APPLICATION, OPTION C.

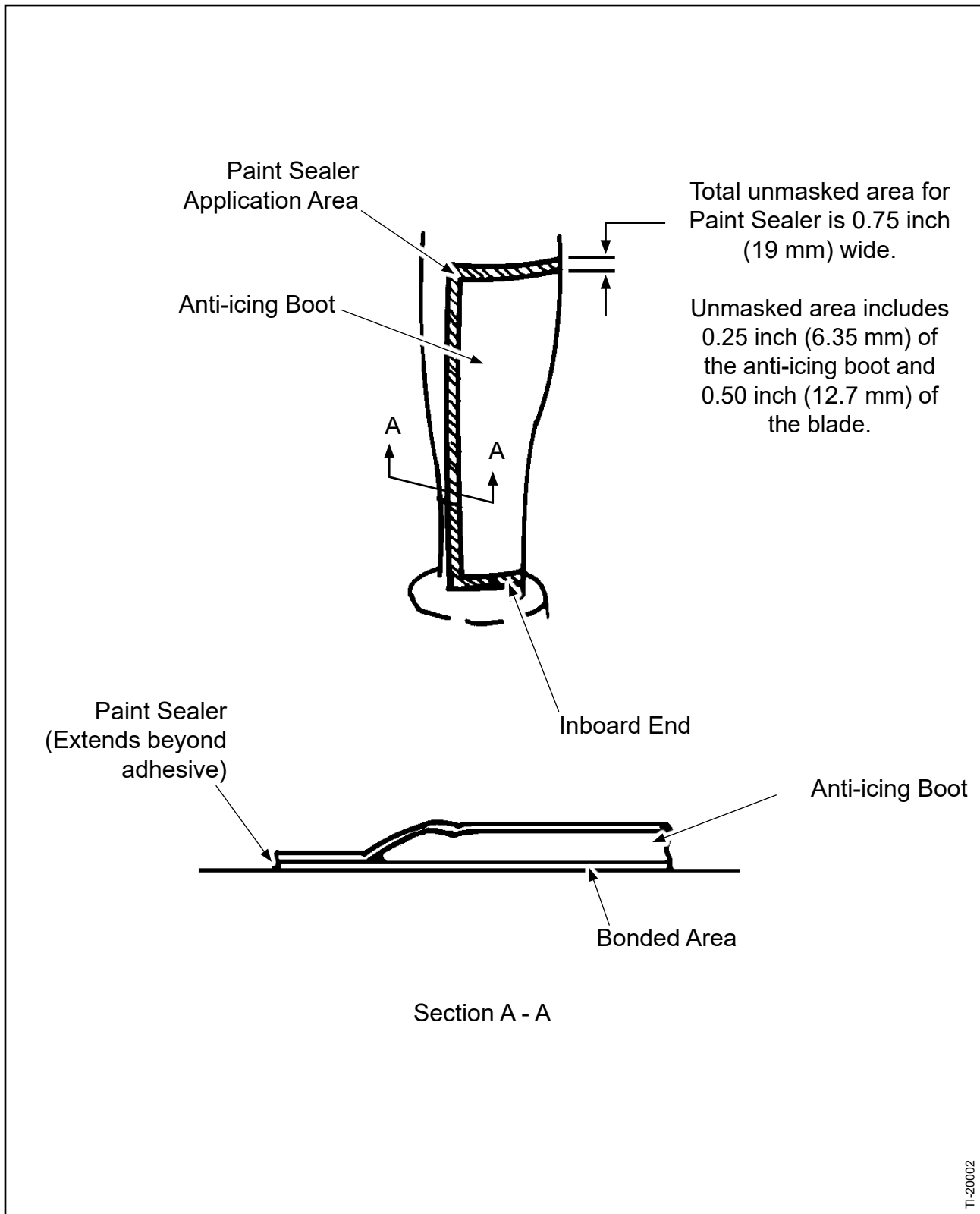
- (e) When using Adhesive Application, Option C: near the end of the tack life, the adhesive may appear to be dry, but is still active and does not require reapplication or reactivation.
- (2) When the boot is correctly positioned, roll firmly along the centerline with an appropriate roller. Refer to Figure 2-5.
  - (a) Gradually tilt the roller and carefully work the boot over each side of the blade contour.
  - (b) Avoid trapping air beneath the boot.
- (3) Roll outward from the centerline to the edges. Refer to Figure 2-5.
  - (a) Work out excess material at the outboard edge on the centerline of the boot before the other edges are completely rolled down.
  - (b) If excess material at the edges puckers, work out smoothly and carefully with fingers.
- (4) After the boot is installed, permit the adhesive to dry a minimum of eight hours before applying the filler, if applicable.

**D. Inspection**

**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.

**CAUTION:** MAKE SURE THAT THE ANTI-ICING BOOT APPLICATION HAS CURED A MINIMUM OF 8 HOURS BEFORE INSPECTING.

- (1) Make sure that the anti-icing boot is in the proper position. Refer to Figure 2-2 and Table 2-2.
  - (a) Examine the boot for proper distance from the shank of the blade.
- (2) After the installation has cured a minimum of 8 hours, at 50° F (10° C) or above visually inspect the entire edge of the boot to make sure that it has correctly bonded to the blade.
- (3) Make an inspection of the bond of the edges of the anti-icing boot.
  - (a) Using a thumb with moderate pressure and a twisting motion, verify the bond.
  - (b) If there is a loose area, bond as necessary using the same adhesive that was initially used for the installation.
  - (c) Using an appropriate roller, roll the area where the adhesive was reapplied and permit to cure before making another inspection.
  - (d) Make another inspection of the bond of the edges of the boot.
  - (e) If there is a loose area, repeat steps 3.D.(3)(b) through 3.D.(3)(d).
  - (f) When the bond of the edges of the boot is satisfactory, continue to the next step.



Anti-icing Boot Paint Sealer Application  
Figure 2-6

E. Paint Sealer Application

**CAUTION:** USE PAINT SEALER ON EVERY ANTI-ICING BOOT TO PROTECT THE ADHESIVE BOND LINE AND PREVENT BLADE CORROSION UNDER THE BOOT.

- (1) Filler is not necessary on an anti-icing boot, but an anti-icing boot must have paint sealer.
- (2) The paint sealer for an anti-icing boot is Mixture Number 5. Refer to the "Material Information" section in this chapter for mixture requirements.
- (3) Apply masking material to the anti-icing boot so that approximately 0.25 inch (6.35 mm) of the boot edge is exposed.
- (4) Apply masking material to the blade approximately 0.5 inch (12.7 mm) outside of the anti-icing boot and around the edges of the boot. Refer to Figure 2-6.

**NOTE:** There will be an unmasked area approximately 0.75 inch (19 mm) wide (0.5 inch [12.7 mm] outside of the anti-icing boot and 0.25 inch [6.35 mm] inside the area of the boot).

- (5) Apply masking material to the blade shank and blade retention radius.
- (6) Apply wash primer (Mixture #3) over the area to be sealed and permit the wash primer to dry.
- (7) Apply two layers of paint sealer over the area between the masked surfaces.
  - (a) Immediately remove all masking material.
  - (b) Permit the painter sealer to dry.

**F. Final Inspection**

- (1) Run a thumb over the edges of the anti-icing boot to make sure that all the anti-icing boot edges are bonded tightly.
- (2) If the anti-icing boot is not tight, re-bond loose areas, permit to cure, and re-apply paint sealer.
- (3) If not previously accomplished, verify the correct distance from shank to the anti-icing boot edge. Refer to Table 2-2 and Figure 2-2.

**G. Minimum Required Dry/Cure Times**

- (1) Wait a minimum of 12 hours after the anti-icing boot installation procedure is completed before starting the aircraft engine.
- (2) Wait a minimum of 24 hours after the anti-icing boot installation procedure is completed before operating the anti-ice system.
- (3) The paint sealer will not be fully cured at this point. Operation in adverse conditions may damage the paint sealer.

6. Installing an Anti-icing Boot on a Composite Blade

A. Blade/Boot Preparation

CAUTION 1: EACH ANTI-ICING BOOT ON A SINGLE PROPELLER ASSEMBLY MUST BE LOCATED THE SAME DISTANCE FROM THE HUB FOR ROTATIONAL BALANCE.

CAUTION 2: CLEANLINESS IS NECESSARY FOR PROPER ANTI-ICING BOOT ADHESION. ALL SOLVENTS MUST BE FREE OF CONTAMINANTS. BRUSHES AND CLOTHS MUST BE CLEAN AND LINT FREE. DO NOT TOUCH SURFACES AFTER THEY HAVE BEEN PREPARED FOR THE ANTI-ICING BOOT INSTALLATION.

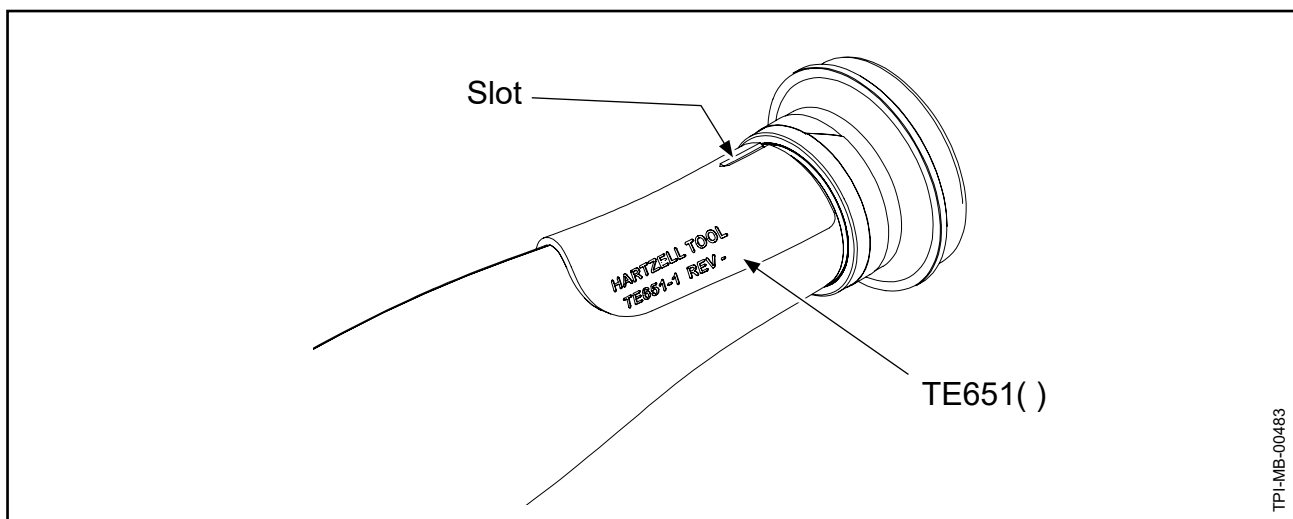
(1) Mark the blade centerline.

(a) All composite blades except 76C04( ):

- 1 Locate the blade centerline by sighting down the leading edge from the blade tip to the blade shank.
- 2 Using a crayon, soft non-graphite pencil CM162 or equivalent, make a centerline mark on the blade shank (or winding) in line with the leading edge.

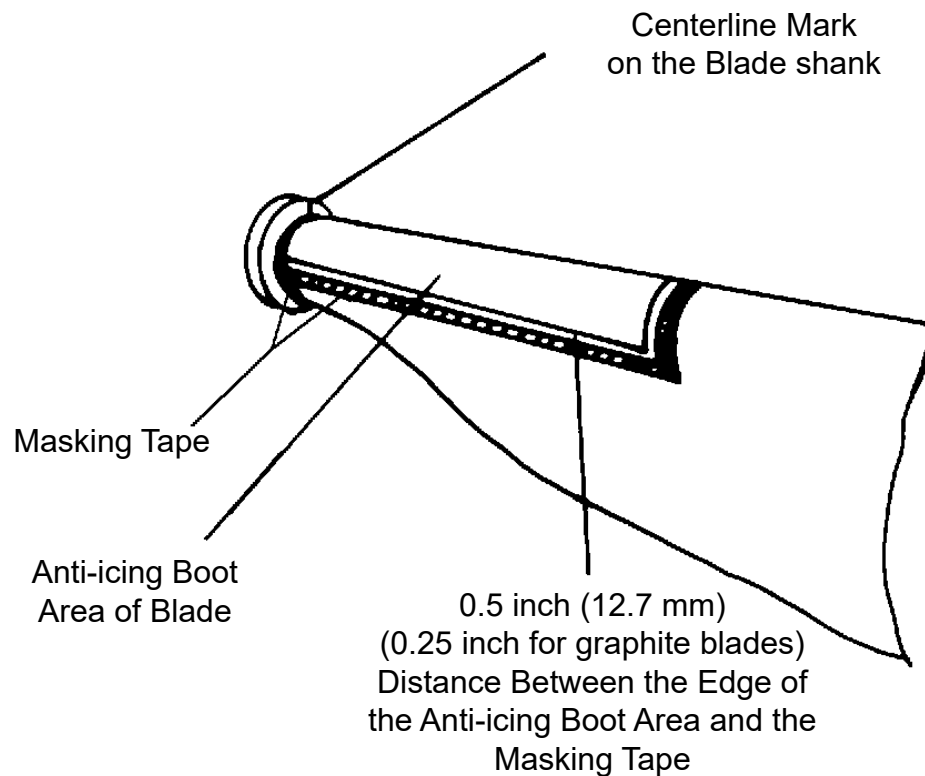
(b) 76C04( ) Blades Only:

- 1 Put the blade boot alignment tool TE651-1 on the leading edge of the blade and slide it toward the shank until it stops as shown in Figure 2-7
- 2 Using a crayon, soft non-graphite pencil CM162 or equivalent, make a centerline mark on the blade at the slot in the blade boot alignment tool TE651-1.



**Blade Boot Alignment Tool TE651( )**  
**Figure 2-7**





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**Masking the Blade for Anti-icing Boot Adhesive Application**  
**Figure 2-7.1**

- (2) Put the boot on the blade with the inboard edge of the boot aligned with the "A" or "C" dimension mark.
  - (a) Refer to the section, "Determine the Boot Location on the Blade" in this chapter to determine the correct "A" or "C" dimension.
- (3) Mask the blade for sanding.
  - (a) Fold the anti-icing boot over the blade and hold it in position.
  - (b) Using a non-graphite pencil, mark a line approximately 0.5 inch (12 mm) away from the anti-icing boot around the entire perimeter, except at the shank.
  - (c) Remove the anti-icing boot and apply masking material to protect the area outside of the marking. Refer to Figure 2-7.1.
- (4) Sand the boot location on the blade.
  - (a) For better anti-icing boot adhesion, hand sand the area inside the masking tape with 120 to 160 grit sandpaper until the polane painted surface is totally scuffed.
- (5) Remove all masking material from the blade that was used as the sanding guide.
- (6) Using a clean cloth dampened with denatured alcohol, clean the entire anti-icing boot location on the blade with denatured alcohol only.
- (7) Mask the blade for adhesive application.
  - (a) Examine the blade to make sure that the blade centerline is clearly defined at the inboard end of the anti-icing boot location. Refer to step 6.A.(1) for details.
  - (b) Apply masking material to the surface of the blade, leaving 0.50 inch (12.7 mm) of the non-sanded surface exposed around the sanded area. Refer to Figure 2-7.1.

**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.

- (8) Moisten a clean cloth with solvent MEK CM106, MPK CM219, or toluene CM41 and clean the bond-side of the anti-icing boot.
- (9) Permit the solvent to evaporate.

**B. Adhesive Application**

**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:** THE BLADE AND ANTI-ICING BOOT CONTACTING SURFACES TO BE BONDED MUST BE THOROUGHLY AND COMPLETELY COVERED WITH ADHESIVE. TWO LAYERS OF ADHESIVE ARE REQUIRED. DO NOT APPLY ADHESIVE OR INSTALL THE ANTI-ICING BOOT IF THE RELATIVE HUMIDITY IS ABOVE 90% OR IF THE TEMPERATURE IS BELOW 50° F (10° C). FOR BEST RESULTS, APPLY ADHESIVE AND PERFORM ANTI-ICING BOOT INSTALLATION AT TEMPERATURES BETWEEN 65-75°F (19-23°C), WITH RELATIVE HUMIDITY EQUAL TO OR LESS THAN 90%. CURING TIMES VARY WITH TEMPERATURE AND RELATIVE HUMIDITY. IF RELATIVE HUMIDITY IS BETWEEN 75-90%, PERMIT ADDITIONAL CURING TIME. WHEN ADHESIVE IS APPLIED AT TEMPERATURES BELOW 65°F (19° C), THE BOND STRENGTH IS DIMINISHED REGARDLESS OF THE LENGTH OF CURING TIME.

- (1) For best results, apply adhesive at room temperature (65° - 75° F [18°-24°C]). Drying time will vary with temperature and relative humidity.
- (2) An anti-icing boot may be installed on a blade while it is installed in the hub.
  - (a) The propeller blade being serviced must be positioned in a manner to prevent the contamination of other propeller components.
  - (b) Dynamic balance of the propeller assembly is recommended after an anti-icing boot is replaced on a blade while in the hub.

- (3) There are three different adhesive options available for anti-icing boot installation.

(a) Adhesive Application, Option A

**WARNING:** ADHESIVE CM10 IS EXTREMELY FLAMMABLE. USE ONLY IN A WELL VENTILATED AREA AWAY FROM SPARKS OR FLAME. AVOID PROLONGED BREATHING OF VAPORS. AVOID PROLONGED OR REPEATED CONTACT WITH SKIN. READ AND OBSERVE ALL WARNING LABELS.

- 1 Mix adhesive CM10 thoroughly.
- 2 Apply one even layer of adhesive CM10 to the anti-icing boot and one even layer of adhesive CM10 to the masked area of the blade where the anti-icing boot will be installed.
- 3 Permit the adhesive CM10 to dry a minimum of one hour.
- 4 Apply a second even layer of adhesive CM10 to the anti-icing boot and to the masked area of the blade where the first layer of the adhesive mixture was applied.
- 5 Permit the surfaces to dry until the adhesive is slightly sticky to the touch (as if touching the glue-side of masking tape).

(b) Adhesive Application, Option B

- 1 Stir primer CM57 thoroughly.
- 2 Apply one even layer to the masked area of the blade where the anti-icing boot will be installed.
- 3 Permit the primer CM57 to air dry for a minimum of one hour before applying the adhesive mixture.

**CAUTION:** THOROUGHLY STIR CURING AGENT CM114 BEFORE MIXING IT WITH THE ADHESIVE BECAUSE THE INGREDIENTS OF THE CURING AGENT MAY HAVE SEPARATED.

- 4 Mix 9 parts adhesive CM79 with 1 part curing agent CM114 by volume. Thoroughly mix until a consistent color tone is present.
- 5 Apply one even layer of the adhesive mixture to the bond-side of the anti-icing boot and to the masked area of the blade where primer CM57 was applied.
- 6 Permit the adhesive mixture to air dry for a minimum of one hour.
- 7 Apply a second even layer of the adhesive mixture to the bond-side of the anti-icing boot and to the masked area of the blade where primer CM57 was applied.
- 8 Permit the surfaces to dry until the adhesive is slightly sticky to the touch (as if touching the glue side of masking tape).

(c) Adhesive Application, Option C

- 1 Stir primer CM216 thoroughly.
- 2 Apply one even layer of primer CM216 to the masked area of the blade where the anti-icing boot will be installed.
- 3 Permit the primer CM216 to air dry for a minimum of one hour before applying the adhesive mixture.

**CAUTION: THOROUGHLY SHAKE THE CONTAINER OF ADHESIVE CURING AGENT CM218 BEFORE MIXING IT WITH THE ADHESIVE, BECAUSE THE INGREDIENTS OF THE CURING AGENT MAY HAVE SEPARATED.**

- 4 Mix adhesive CM217 with the adhesive curing agent CM218 in accordance with the manufacturer's technical data sheet. Thoroughly mix until a consistent color tone is present.
- 5 Apply one even layer of the adhesive mixture to the bond-side of the anti-icing boot and to the primed area of the blade.
- 6 Permit the adhesive mixture to air dry for a minimum of one hour.
- 7 Apply a second layer of the adhesive mixture to the bond-side of the anti-icing boot and to the area of the blade to be booted.
- 8 Permit the surfaces to dry until the adhesive is slightly sticky to the touch (as if touching the glue-side of masking tape).
- 9 Tack life is 10 to 20 minutes.

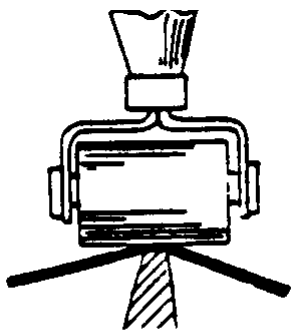
### C. Anti-icing Boot Installation

**CAUTION:** THE BONDING SURFACES MUST BE THOROUGHLY COVERED WITH ADHESIVE. TWO LAYERS OF ADHESIVE ARE REQUIRED.

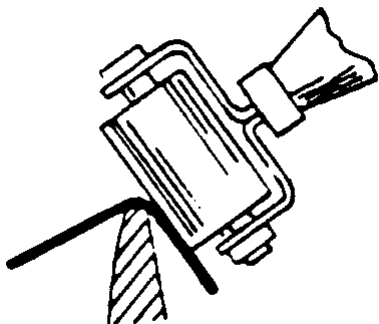
- (1) For best results, install the anti-icing boot at room temperature (65° - 75° F [18°-24°C]). Drying time will vary with temperature and relative humidity.
- (2) To locate the inboard end of the new anti-icing boot:
  - (a) If the blade is not installed in the hub, make sure that the pencil mark at distance "A" is in line with the leading edge of the blade. Refer to Table 2-2 and Figure 2-3.
    - 1 Refer to the "Determine the Boot Location on the Blade" section of this chapter for details.
  - (b) If the blade is installed in the hub, use either the dimension noted before the removal of the previous anti-icing boot, or the "C" dimension, to locate the inboard end of the new anti-icing boot. Refer to Table 2-2 and Figure 2-3.
    - 1 Refer to the "Determine the Boot Location on the Blade" section of this chapter for details.
- (3) Starting at the shank end, put the inboard end of the anti-icing boot at the appropriate dimension mark while aligning the indicated centerline of the anti-icing boot with the centerline of the blade, marked on the winding.
- (4) Working outward, slowly lower the outboard end of the anti-icing boot to the blade while tacking the centerline of the anti-icing boot onto the crest of the leading edge of the blade.
  - (a) If the anti-icing boot becomes misaligned, pull up with a quick motion and reapply the anti-icing boot.
  - (b) If the adhesive is removed from either surface, reapply the adhesive and permit to dry until tacky before continuing application of the anti-icing boot.
  - (c) When using Adhesive Application, Option A or Option B in the "Adhesive Application" section of this chapter, if the adhesive becomes too dry, reactivate with a clean, lint free cloth dampened with solvent MEK CM106, MPK CM219, toluene CM41, or acetone CM11.

**CAUTION:** DO NOT REACTIVATE THE ADHESIVE WHEN USING ADHESIVE APPLICATION, OPTION C.

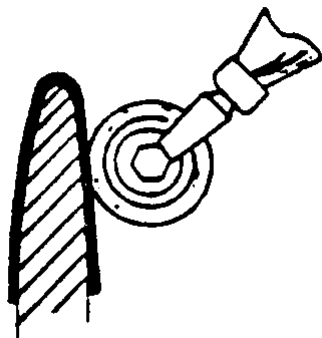
- (d) When using Adhesive Application Option C in the "Adhesive Application" section of this chapter, toward the end of the tack life, the adhesive may appear to be dry, but is still active and does not require reactivation.



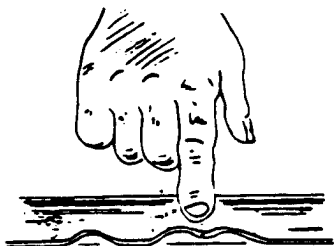
Step 1 Roll firmly along the centerline with a rubber or silicon roller.



Step 2 Gradually tilt the roller and carefully work the anti-icing boot over each side of the blade contour.



Step 3 Roll outward from the centerline to the edges.



Step 4 If excess material at the edges puckers, work out smoothly and carefully with fingers

APS0298

Rolling the Anti-icing Boot onto a Composite Blade  
Figure 2-8

- (5) When the centerline is correctly positioned, roll firmly along the centerline with a rubber roller such as TE330 or TE331. Refer to Figure 2-8.
- (6) Gradually tilt the roller and carefully work the anti-icing boot over one side of blade contour using care to avoid trapping air under the anti-icing boot.
  - (a) Start inboard on the anti-icing boot and work outboard.
  - (b) After one side is initially rolled into place apply the other side in the same fashion.

**NOTE:** Short repetitive strokes in a diagonal direction from an inboard position towards the outboard trailing edge, with small advancements toward the tip of the blade with every stroke is an effective way to eliminate the trapping of air and the puckering of the anti-icing boot material.

- (7) Work out excess material at the outboard edge of the anti-icing boot before the edge is completely rolled down.
  - (a) If excess material at the edges tends to pucker, work out puckers smoothly and carefully with fingers.
  - (b) Puckers are not permitted.
- (8) Use the edge of a roller to firmly roll down the tapered edges of the anti-icing boot.
  - (a) A roller may be used only within 0.1875 inch (4.762 mm) from any edge.
- (9) Remove masking tape and permit the anti-icing boot installation to dry (cure) a minimum of 8 hours.

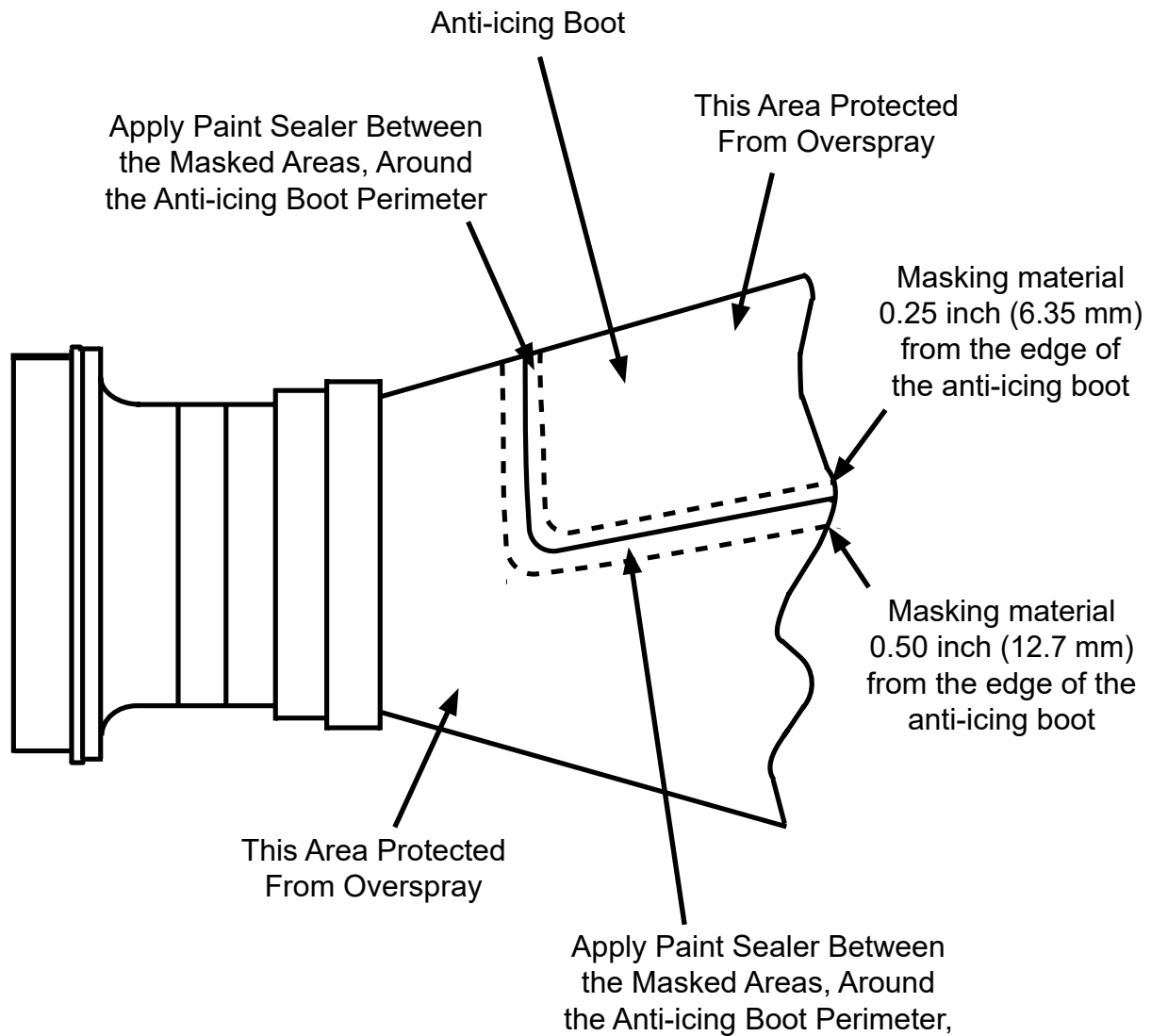


**D. Inspection**

**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:** MAKE SURE THAT THE ANTI-ICING BOOT APPLICATION HAS CURED A MINIMUM OF 8 HOURS BEFORE INSPECTING.

- (1) Make sure that the anti-icing boot is in the proper position. Refer to Figure 2-3 and Table 2-2.
  - (a) Examine the anti-icing boot for proper distance from the shank of the blade.
  - (b) If the blade is installed in a hub, make sure that all anti-icing boots are located at the same radial distance from the hub.
- (2) After the installation has cured a minimum of 8 hours, at 50° F (10° C) or above visually inspect the entire edge of the anti-icing boot to make sure that it has correctly bonded to the blade.
- (3) Make an inspection of the bond of the edges of the anti-icing boot.
  - (a) Using a thumb with moderate pressure and a twisting motion, verify the bond.
  - (b) If there is a loose area, bond as necessary using the same adhesive that was initially used for the installation.
  - (c) Using an appropriate roller, roll the area where the adhesive was reapplied and permit to cure before making another inspection.
  - (d) Make another inspection of the bond of the edges of the anti-icing boot.
  - (e) If there is a loose area, repeat steps 6.D.(3)(b) through 6.D.(3)(d).
  - (f) When the bond of the edges of the anti-icing boot is satisfactory, continue to the next step.



TI-4138

Anti-icing Boot Paint Sealer Masking Application  
Figure 2-9

**E. Paint Sealer Application**

**CAUTION: USE PAINT SEALER ON EVERY ANTI-ICING BOOT TO PROTECT THE GLUE BOND LINES OF THE ANTI-ICING BOOT.**

**(1) Masking Application - Refer to Figure 2-9**

- (a) Apply masking material to the blade and anti-icing boot so that when the paint sealer is applied, it will cover sections of the blade (minimum overlap) as follows:

- 1 All areas of exposed adhesive.
- 2 0.50 inch (12.7 mm) of the blade surface around the edge of the anti-icing boot on Kevlar® blades, 0.25 inch (6.3 mm) on graphite blades.
- 3 0.25 inch (6.3 mm) of the anti-icing boot edges.

**(2) Paint Sealer Application Procedure**

- (a) Use of filler is not necessary on an anti-icing boot, but an anti-icing boot must have paint sealer.
- (b) Prepare paint sealer black polane paint, Mix #5.
- (c) Apply two even layers of the paint sealer to the area around the anti-icing boot.
- (d) Remove all masking material immediately.
- 1 Permit the paint to cure for approximately 30 minutes before handling the blade.

**F. Final Inspection for a Composite Blade**

**(1) Procedures**

- (a) Run a thumb over the edges of the anti-icing boot to make sure that all the anti-icing boot edges are bonded tightly.
- 1 If the anti-icing boot is not tight, re-bond loose areas, permit to cure, and re-apply the paint sealer.
  - 2 If not previously accomplished, verify the correct distance from shank to the anti-icing boot edge. Refer to Table 2-2 and Figure 2-3.

**G. Minimum Required Dry/Cure Times**

- (1) Wait a minimum of 12 hours after the anti-icing boot installation procedure is completed before starting the aircraft engine.
- (2) Wait a minimum of 24 hours after the anti-icing boot installation procedure is completed before operating the anti-ice system.
  - (a) The paint sealer will not be fully cured at this point. Operation in adverse conditions may damage the paint sealer.

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**DE-ICE BOOTS - CONTENTS, continued**

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## 1. Important Information

**WARNING:** REMOVAL AND INSTALLATION OF A PROPELLER BLADE BOOT REQUIRES THE USE OF SOLVENTS, PAINTS, AND OTHER CHEMICALS THAT MAY BE HAZARDOUS. ALWAYS FOLLOW THE MANUFACTURER'S SAFETY PRECAUTIONS AND DISPOSAL REQUIREMENTS.

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

**CAUTION 2:** GRAPHITE ("LEAD") PENCIL MARKS WILL CAUSE CORROSION.

### A. General

- (1) This chapter contains the Hartzell Propeller approved procedures for:
  - (a) Removing and installing a de-ice, restrainer strap, and erosion tape on a metal blade
  - (b) Removing and installing a de-ice boot, terminal mount strap, restrainer strap, and erosion tape on a composite blade

### B. Personnel Requirements

- (1) Propeller disassembly and reassembly may only be performed by qualified personnel at an appropriately licensed propeller repair facility.
- (2) Replacement of a propeller blade boot on an assembled propeller may be performed by qualified personnel with sufficient training and certifications (when required by the applicable Aviation Authority) to accomplish the work required in a safe and airworthy manner.

**CAUTION:** DO NOT INSTALL A CRACKED, DELAMINATED, OR DAMAGED DE-ICE BOOT ON A BLADE .

### C. Read Before Removing/Installing a De-ice Boot

- (1) Before installing a de-ice boot on a blade, examine the boot for cracking, delamination, or other damage.
  - (a) A de-ice boot has no stated storage shelf life limit. The condition of the boot determines if it may be installed on a blade.
- (2) When a de-ice boot is replaced on a propeller blade while installed in the hub, position the propeller blade to prevent the contamination of other propeller components.

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- (3) Balancing of the propeller assembly is recommended after a de-ice boot is replaced on a propeller blade. Refer to the applicable Aircraft Maintenance Manual and Hartzell Propeller Standard Practices Manual 202A (61-01-02).
- (4) When using Methyl Propyl Ketone (MPK) CM219, the dry time and the time required after adhesive reactivation for the adhesive to become slightly sticky to the touch is significantly longer than when using Methyl Ethyl Ketone (MEK) CM106.
- (5) De-ice boots have two distinctly different sides.
  - (a) The bond-side is the textured side on which the adhesive is placed and is toward the blade surface.
  - (b) The breeze-side is the smooth side away from the surface of the blade and adhesive is not placed on this side.

**2. Paint Mixtures**

**A. Mixture Number 3 - Wash Primer**

<u>CM Number</u>	<u>Description</u>	<u>Quantity</u>
CM24	Wash Primer	4 parts
CM25	Reducer, Wash Primer	4 parts
CM26	Acid Diluent	1 part

Let stand for 30 minutes before using

**B. Mixture Number 5**

<u>CM Number</u>	<u>Description</u>	<u>Quantity</u>
CM33	Paint, Polane® Black	6 parts
CM30	Catalyst	1 part
CM32	Polane Reducer	1-3 parts (as required to achieve desired dry thickness)
CM31	Accelerator	as needed

### 3. Erosion Tape Removal/Installation (Metal and Composite Blades)

#### A. Removal

CAUTION: IF THE EROSION TAPE CM158 IS BEING REPLACED AND THE BOOT WILL NOT BE REMOVED, MAKE SURE THAT THE BOOT IS NOT DAMAGED AND THAT THE SEAL BETWEEN THE BOOT AND THE BLADE IS NOT AFFECTED WHEN THE TAPE IS REMOVED.

- (1) Lift one edge of the erosion tape CM158 off of the boot.
- (2) Work around the perimeter of the erosion tape CM158, lifting the edge of the tape from the boot.
- (3) After the edge of the erosion tape CM158 is pulled up from the boot, pull the erosion tape off one side of the blade towards the leading edge.
- (4) With the erosion tape CM158 stuck to only one side of the blade, grasp one end of the erosion tape and pull towards the other end of the boot.
- (5) Discard the removed erosion tape CM158.

CAUTION: Do not permit the solvent to seep under the boot or the strap.

- (6) If the erosion tape CM158 is being replaced and the boot will not be removed, remove all visible adhesive from the breeze-side of the de-ice boot, using a clean cloth dampened with solvent toluene CM41, MEK CM106, or MPK CM219.

B. Installation

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

CAUTION 1: DO NOT INSTALL EROSION TAPE CM158 ON A BOOT THAT HAS CURED LESS THAN 12 HOURS.

CAUTION 2: DO NOT INSTALL EROSION TAPE CM158 ON A BOOT THAT HAS PAINT SEALER THAT HAS CURED LESS THAN 8 HOURS.

CAUTION 3: DO NOT INSTALL EROSION TAPE CM158 ON A BOOT UNLESS THE BLADE MODEL/PROPELLER/AIRCRAFT APPLICATION IS LISTED IN TABLE 3-1, TABLE 3-2, OR TABLE 3-2.1.

(1) General

- (a) A minimum temperature of 60°F (10°C) is required for erosion tape CM158 application.
- (b) Keep hands clean at all times.
- (c) A boot must be installed on a blade for a minimum of 12 hours before installing erosion tape CM158.
- (d) The erosion tape CM158 may be applied before or after the application of the paint sealer.
  - 1 Paint sealer must cure for a minimum of 8 hours before installing erosion tape CM158.

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(2) Required/Optional Applications

(a) Composite Blades

- 1 Application of erosion tape CM158 is required for the composite blade models listed in Table 3-1.
  - a On the E13890K blade, applying erosion tape to the boot area of the shank provides additional protection from ice shedding from the spinner dome. Erosion tape application in this area is optional.
- 2 Application of erosion tape CM158 is optional for the composite blade models listed in Table 3-1.1.

Blade Model	Propeller Model	Aircraft	Tape Length (per blade)
E9193(B,K)	HC-E5A-2	Pilatus	14.50 inches (368.3 mm)
E13890K	HD-E6C-3B	Dornier	Standard Configuration: 34.25 inches (870.0 mm)
			Alternate Configuration: 33.125 inches (841.4 mm) + 7.5 inches (190.5 mm) for the shank

**Composite Blades/Erosion Tape Required  
Table 3-1**

Propeller Model	Blade Model	De-ice Boot p/n	Aircraft	Tape Length (per blade)
HC-E4N-3A	NC9208K	103503	Beechcraft (Textron) B200, B200C, B200GT, B200CGT	13.25 inches (336.5 mm)
HC-E5A-3A	NC10245B*6	107383	Epic E1000	17.25 inches (438.1 mm)
HC-E5A-3( )	NC10245B(*1)	105622	Pilatus PC-12, PC-12/45, PC-12/47, PC-12/47E	17.25 inches (438.1 mm)
HC-E5A-3( )	NC10245B(*1,*4,*5)	107383	Pilatus PC-12, PC-12/45, PC-12/47, PC-12/47E	17.25 inches (438.1 mm)
5D3-N338A1	78D01B(*2)	106167	Piper PA-46-500TP, PA-46-600TP	14.5 inches (368.3 mm)

**Composite Blades/Erosion Tape Optional  
Table 3-1.1**

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(b) Metal Blades

- 1 Application of erosion tape CM158 is required for the metal blade models listed in Table 3-2.
- 2 Application of erosion tape CM158 is optional for the metal blade models listed in Table 3-2.1.

(3) Preparation

- (a) Cut the appropriate length of erosion tape CM158 in accordance with the applicable Table 3-1, Table 3-1.1, Table 3-2, or Table 3-2.1.
- (b) Radius the corners to 0.5 inch (13 mm) to remove any sharp corners.
- (c) Using chalk or a ball point pen, measure and make a mark on the nonadhesive side of the erosion tape CM158 sections to indicate the centerline.

Blade Model	Propeller Model	Aircraft	Tape Length (per blade)
D9690B	HC-E4N-5D	Hartzell Propeller LLC STC SA226-TC Metro II	12 inches (304.8 mm)
M10876ANSK*1	HC-B5MP-3D	Polish Aviation (Mielec) M-28	17 inches (431.8 mm)
M10876ANSK*4	HC-B5MP-3(D,G)	Polish Aviation (Mielec) M-28B	17 inches (431.8 mm)
LT10890NK	HC-B4TN-5QL	Aero Twin Cessna 208	21 inches (533.4 mm)
LT10891NK	HC-B4TN-5QL	Aero Twin Cessna 208	21 inches (533.4 mm)
LT10890NK	HC-B4TN-5QL	Texas Turbines Cessna 208( )	21 inches (533.4 mm)
LT10891NK	HC-B4TN-5QL	Texas Turbines Cessna 208( )	21 inches (533.4 mm)
M11276NK-3	HC-B5MA-5A	Antonov	20 3/4 inches (527.0 mm)

**Metal Blades/Erosion Tape Required  
Table 3-2**

Blade Model	Propeller Model	Aircraft	Tape Length (per blade)
M11691NSK*1	HC-B5MA-3D(T)	Air Tractor AT-802	17 inches (431.8 mm)

**Metal Blades/Erosion Tape Optional  
Table 3-2.1**

**CAUTION:** DO NOT PERMIT THE SOLVENT TO COME IN CONTACT WITH THE DE-ICE BOOT EDGE SEAL.

- (d) Using a clean cloth dampened with solvent toluene CM41, MEK CM106, MPK CM219, or isopropyl alcohol CM183, thoroughly clean the application area of the boot surface.

- 1 Immediately wipe the area dry with a clean, lint-free cloth.
- 2 Permit the area to air dry.
- 3 Repeat the cleaning and drying of the application area.

(4) Masking

(a) Metal Blades

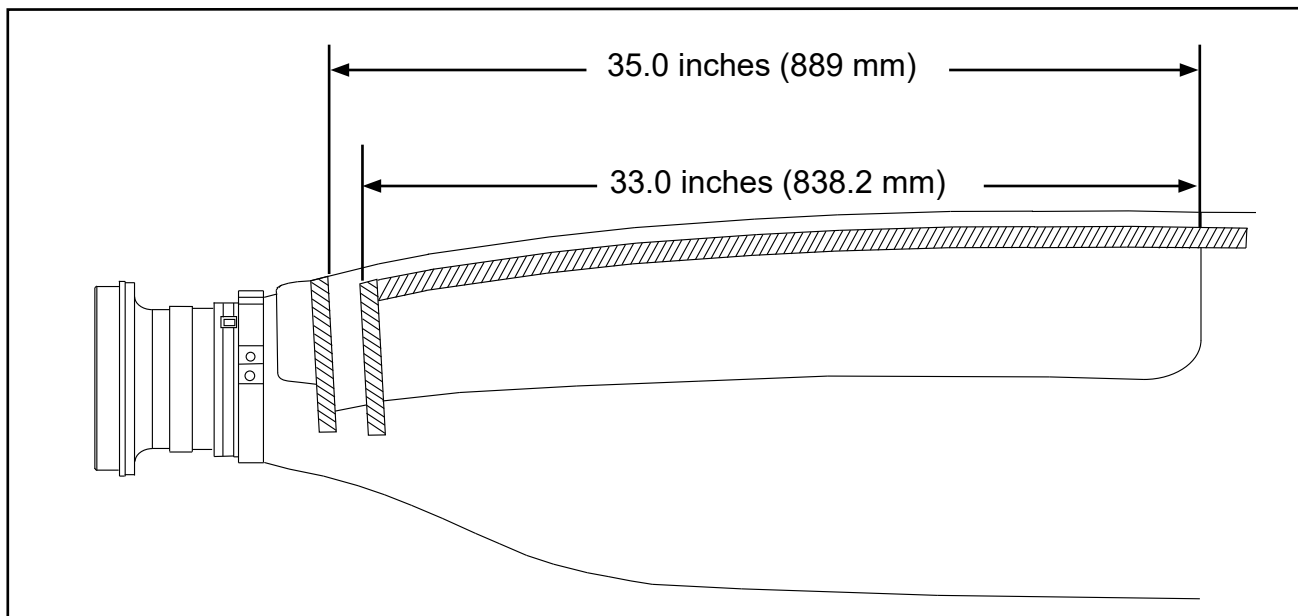
- 1 Apply masking material to the perimeter of the area that will receive erosion tape CM158, approximately 2.0 inches (5.1 mm) x 34.25 inches (869.9 mm).
  - a Start at the outboard end of the de-ice boot.

(b) Composite Blades: E9193(B,K) and E13890K (standard configuration):

- 1 Using plastic tape #1280 circuit plating tape (or equivalent) as masking material, apply to the perimeter of the area that will receive erosion tape CM158. The area that will receive erosion tape is approximately 2.0 inches (5.1 mm) x 34.25 inches (869.9 mm) on the leading edge.
- 2 Start at the outboard end of the boot.

(b) Composite Blade: E13890K (alternate configuration):

- 1 Using plastic tape #1280 circuit plating tape (or equivalent) as masking material, apply to the perimeter of the area that will receive erosion tape CM158. The area that will receive erosion tape is approximately 2.0 inches (5.1 mm) x 34.25 inches (869.9 mm) on the leading edge.
- 2 Apply an additional piece of #1280 circuit plating tape (or equivalent) at a right angle to the inboard end of the boot where the previously applied masking tape ends. Refer to Figure 3-1.
- 3 Apply another piece of #1280 circuit plating tape (or equivalent) 2.0 inches (50.8 mm) inboard from the piece applied in the previous step. Refer to Figure 3-1.



**Alternate Configuration of E13890K Blade  
Figure 3-1**



(5) Application of Optional Adhesive Promoter CM124

NOTE: Adhesive promoter CM124 will increase the adhesion between the erosion tape CM158 and the boot.

- (a) Apply a thin, uniform layer of adhesive promoter CM124 to the bonding surface of the boot.
  - 1 Using a minimal amount, apply a layer of adhesive promoter CM124 to the bonding surface of the boot.
  - 2 Remove the plastic tape used as masking material.

CAUTION: THE ADHESIVE PROMOTER CM124 WILL BEGIN TO LOSE ADHESION AFTER 60 MINUTES AT ROOM TEMPERATURE.

- (b) Permit the adhesive promoter CM124 to dry at room temperature for a minimum of 15 minutes, and a maximum of 60 minutes.

- (6) Installation of the Erosion Tape CM158
- (a) Peel approximately 6 inches (152.4 mm) of the backing material from one end of the erosion tape CM158.
  - (b) Align the end of the exposed section of the erosion tape CM158 with the outboard end of the boot, while aligning the marked centerline with the leading edge of the blade.
  - (c) Press the erosion tape CM158 into position on the leading edge of the blade while maintaining light tension on the tape (toward the shank).
  - (d) Peel the backing material from the erosion tape CM158 as the alignment of the tape advances towards the shank of the blade.
  - (e) Using a roller or fingers, press the erosion tape CM158 down onto the leading edge of the blade.
  - (f) Using a roller or fingers, work the erosion tape CM158 into position on one side of the blade.
    - 1 Starting at the outboard end of the boot and working toward the shank, use a hard rubber or nylon roller to firmly seat the erosion tape CM158 to the boot.
    - 2 Make sure that there are no wrinkles and that no air is trapped under the erosion tape CM158.
- CAUTION: DO NOT DAMAGE THE BOOT WHEN REMOVING AIR BUBBLES.**
- 3 Remove air bubbles under the erosion tape CM158 by carefully puncturing the tape with a sharp pin and pressing out the trapped air.
  - (g) Repeat the procedure on the other side of the blade.
  - (h) Additional cure time is not required for the erosion tape CM158 installation alone, but the paint sealer application cure cycle is still in effect.

#### 4. De-ice Boot and Terminal Mount Strap Removal

##### A. Before Removing the Boot:

- (1) When the boot is to be replaced other than at an overhaul:
  - (a) Make a record of the currently installed de-ice/anti-icing boot part number and compare it to the part number listed in Hartzell Propeller Application Guide Manual 159 (61-02-59), to confirm that the correct replacement boot is used.
    - 1 Refer to Hartzell Propeller Service Letters HC-SL-30-260 and HC-SL-30-279 for additional approved de-ice/anti-icing boots manufactured by Hartzell Propeller LLC.
- (2) When the boot is to be replaced at overhaul:
  - (a) Identify the part number of the de-ice/anti-icing boot for the application. Refer to Hartzell Propeller Application Guide Manual 159 (61-02-59).
    - 1 Refer to Hartzell Propeller Service Letters HC-SL-30-260 and HC-SL-30-279 for additional approved de-ice/anti-icing boots manufactured by Hartzell Propeller LLC.
- (3) Disconnect the de-ice boot leads at the terminal strip, terminal mount strap, or other attachment points, as applicable.
- (4) Remove any clamping devices that the lead wires pass through or tie straps used to secure the de-ice boot and make a record of the positions for reinstallation.

B. Metal Blades: Boot Removal

- (1) Remove and replace each de-ice boot at every propeller overhaul.

**CAUTION:** DO NOT DAMAGE THE BLADE DURING REMOVAL OF THE ANTI-ICE BOOT. IF THE BLADE IS DAMAGED, THE BLADE MUST BE REPAIRED IN ACCORDANCE WITH THE APPLICABLE HARTZELL PROPELLER OWNER'S MANUAL OR HARTZELL PROPELLER ALUMINUM BLADE OVERHAUL MANUAL 133C (61-13-33).

- (2) There are three methods for removing a boot from a metal blade.

**CAUTION:** BEARINGS, COUNTERWEIGHTS, ETC. MUST BE REMOVED FROM THE BLADE WHEN USING METHOD 1.

- (a) Method 1 - Applicable for a disassembled propeller (at overhaul)

**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.

- 1 Submerge the aluminum blade and boot in a vapor de-greaser or strong solvent (toluene CM41, MEK CM106, or MPK CM219).
- 2 Using a nonmetallic scraper, scrape the boot away from the blade.
- 3 Using either a solvent soak of toluene CM41, MEK CM106, or MPK CM219 or plastic media cleaning, remove any remaining adhesive residue and filler, if applicable, from the blade.

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- (b) Method 2 - Applicable for a disassembled or assembled propeller

**CAUTION:** APPLY MASKING MATERIAL TO THE HUB OR CLAMP TO PREVENT CONTAMINATION OF OTHER PROPELLER COMPONENTS.

- 1 When replacing a boot on an assembled propeller, position the propeller blade being repaired to prevent the contamination of other propeller components.
  - a Apply masking material to the hub or clamp to prevent contamination of other propeller components.
- 2 Liberally apply toluene CM41, MEK CM106, or MPK CM219 to loosen a corner of the boot.

**CAUTION:** USE CAUTION WHEN SCORING THE FILLER AT THE EDGE OF THE DE-ICE BOOT. SCORE THE FILLER ONLY AND DO NOT SCRATCH THE PROPELLER BLADE. IF THE PROPELLER BLADE IS DAMAGED, REPAIR THE BLADE IN ACCORDANCE WITH THE APPLICABLE HARTZELL PROPELLER OWNER'S MANUAL OR HARTZELL PROPELLER ALUMINUM BLADE MANUAL 133C (61-13-33).

- 3 If applicable, start at the inboard end of the boot and carefully remove the filler material.
  - a Continue around the entire boot, cutting only the paint seal at the edge of the boot.
  - b Lift the edges of the boot to expose the adhesive between the boot and the blade.
- 4 Repeat the application of solvent and permit to soak for a few minutes.
- 5 Using a nonmetallic scraper, raise the loosened corner of the boot.
- 6 Using pliers, grasp the raised edge of the boot and apply a steady pull.
- 7 Continue applying toluene CM41, MEK CM106, or MPK CM219 along the point of contact between the boot and the blade to loosen the adhesive bond.
- 8 Use a steady pull to remove the boot.
- 9 Remove any remaining adhesive residue and filler, if applicable.
  - a For a disassembled blade, use a solvent soak of toluene CM41, MEK CM106, or MPK CM219 or plastic media cleaning.
  - b For an assembled blade, use a solvent soak of toluene CM41, MEK CM106, or MPK CM219.

- (c) Method 3 - Applicable for a disassembled or assembled propeller

**CAUTION:** USE CAUTION TO PREVENT THE OSCILLATING TOOL FROM DAMAGING THE BLADE.

- 1** Using a locally procured oscillating tool with a scraper blade, remove the boot.

**NOTE:** A higher amperage tool is more effective for removal of the boot.

- a** Start at a sealed edge.
- b** Keeping the scraper blade flat against the blade, slowly slide the scraper blade under the boot.
- c** Remove any remaining adhesive residue and filler, if applicable.
  - (1)** For a disassembled blade, use a solvent soak of toluene CM41, MEK CM106, or MPK CM219 or plastic media cleaning.
  - (2)** For an assembled blade, use a solvent soak of toluene CM41, MEK CM106, or MPK CM219.
- d** Examine the blade for damage in accordance with the applicable propeller owner's manual.
  - (1)** Repair damage in accordance with the applicable propeller owner's manual or Hartzell Propeller Aluminum Blade Overhaul Manual 133C (61-13-33).

C. Composite Blades: Boot/Terminal Mount Strap Removal

- (1) For Composite Blade Model E13890K Only:
  - (a) The terminal mount strap does not have to be removed during the installation of a replacement boot in the field, but must be removed and replaced at blade overhaul.
  - (b) Installation of the terminal mount strap is mandatory when a B-6442 de-ice boot is used on the blade.
- (2) Installation of de-ice erosion tape CM158 is mandatory for blade models E13890K and E9193(B, K). Refer to the section, "Erosion Tape CM158 Removal/Installation (Metal and Composite Blades)" in this chapter.
- (3) Two procedures are approved for removal.
  - (a) Procedure 1 (preferred) causes minimal damage to the paint finish. If successfully followed, the blade should not require refinishing.
  - (b) Procedure 2 requires mandatory refinishing of the blade surface. Procedure 2 is the ideal method for removal at overhaul because all of the paint must be removed from the blade at overhaul.
  - (c) The two procedures may be combined.
- (4) Removal Procedure 1

**WARNING:** MEK CM106, MPK CM219, AND TOLUENE CM41 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.

**CAUTION:** IN THE FOLLOWING PROCEDURES, USE EXTREME CARE NOT TO CUT INTO THE COMPOSITE MATERIAL. **NEVER** SUBMERSE A BLADE IN A SOLVENT SOLUTION TO REMOVE A DE-ICE BOOT.

- (a) Using a clean lint-free cloth dampened with solvent MEK CM106, MPK CM219, or toluene CM41, clean completely around the edges of the boot or terminal mount strap.

**NOTE:** This will assist in loosening the edges of the boot or terminal mount strap before removal.

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- (b) Starting at the inboard end of the boot or terminal mount strap, use a razor blade to carefully remove all the filler material/paint sealer around the boot.
  - 1 Continue around the entire boot or terminal mount strap, cutting only the paint seal at the edge of the boot or terminal mount strap.
  - 2 Lift the edges of the boot or terminal mount strap, to expose the adhesive CM10 between the boot or terminal mount strap, and the blade. Repeat step 4.C.(4)(a) and permit to soak for a few minutes.
- (c) With a paint brush or equivalent, brush the solvent MEK CM106, MPK CM219, or toluene CM41 to loosen a corner of the inboard edge of the boot or terminal mount strap.
- (d) Using vice grips or a similar tool, grasp the corner of the boot or terminal mount strap.
- (e) Steadily pull the boot or terminal mount strap from the blade while continuing to brush the solvent MEK CM106, MPK CM219, or toluene CM41 into the adhesive bond line.
- (f) Using a clean lint-free cloth dampened with solvent MEK CM106, MPK CM219, or toluene CM41, remove excess adhesive from the blade.
  - 1 A cloth, saturated with solvent MEK CM106, MPK CM219, or toluene CM41, put over the boot or terminal mount strap area for 5-10 minutes, is an effective method to soften the adhesive remaining on the blade.
  - 2 To minimize the evaporation of the solvent, wrap the blade in plastic.
- (g) Perform a coin-tap inspection on the erosion shield.
  - 1 Repair debonded areas, or replace the erosion shield, as required, in accordance with the Check, Minor Repair, and Major Repair chapters of Hartzell Propeller Composite Blade Maintenance Manual 135F (61-13-35).
- (h) Where the boot will cover the blade, if the amount of exposed blade is more than 20% of the normally painted area, refinish the blade in accordance with Hartzell Propeller Composite Blade Manual 135F (61-13-35).



(3) Removal Procedure 2

- (a) Starting at one end of the boot or terminal mount strap using a razor blade scraper, cut the adhesive between the boot or terminal mount strap and the blade while pulling the boot or terminal mount strap away from the blade.
- (b) After the boot or terminal mount strap is removed, use a vibratory sander with no coarser than 60 grit sandpaper to remove all remaining adhesive, filler, and paint sealer in the boot or terminal mount strap area.
- (c) Perform a Coin-tap inspection of the erosion shield.
  - 1 Repair debonded areas, or replace the erosion shield, as required, in accordance with the Check, Minor Repair, and Major Repair chapters of Hartzell Propeller Composite Blade Maintenance Manual 135F (61-13-35).
- (d) Refinish the area in accordance with the Finish Procedures chapter of Hartzell Propeller Composite Blade Maintenance Manual 135F (61-13-35).

5. Before Installing the De-ice Boot

A. Determine the Correct Boot for the Application

- (1) To determine the correct de-ice boot for the application, refer to the Hartzell Propeller Application Guide Manual 159 (61-02-59).
  - (a) Refer to Hartzell Propeller Service Letters HC-SL-30-260 and HC-SL-30-279 for additional approved de-ice boots manufactured by Hartzell Propeller LLC.

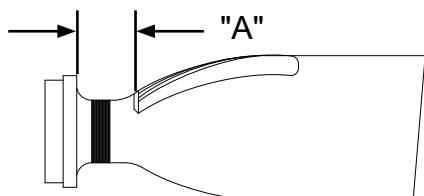
B. Blade Surface Preparation

**WARNING:** IF REQUIRED, APPLY A LAYER OF POLANE PAINT BEFORE INSTALLING A DE-ICE/ANTI-ICING BOOT. BLADES WITH INCORRECTLY PAINTED SURFACES OR SURFACES WITH NO PAINT PROTECTION ARE LIKELY TO DEVELOP CORROSION BENEATH THE BOOT AND MAY HAVE DECREASED ADHESION STRENGTH.

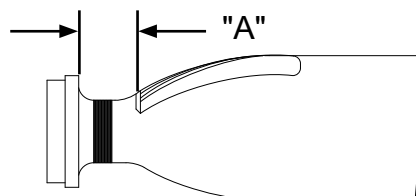
- (1) Install a de-ice boot only on a surface that has a layer of Polane paint.
- (2) If paint was removed from the blade surface during boot removal process:
  - (a) Refinish and paint the area in accordance with the applicable Hartzell Propeller owner's manual or Hartzell Propeller Aluminum Blade Manual 133C (61-13-33).

**CAUTION:** DO NOT INSTALL THE BOOT UNTIL THE PAINT HAS CURED FOR A MINIMUM OF EIGHT HOURS.

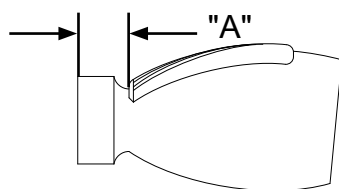
- (b) Cure the paint for a minimum of eight hours before beginning the boot installation procedure.



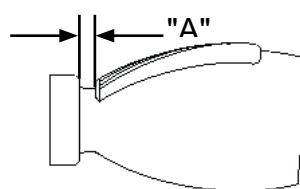
D Shank  
"B" = 2.063 inch  
(52.40 mm)



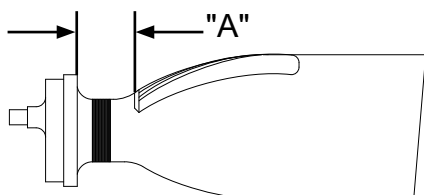
E Shank - Metal Blade Only  
"B" = 1.898 inch  
(48.21 mm)



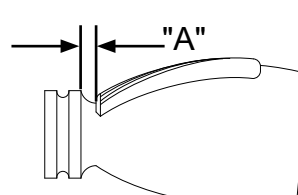
MV Shank  
"B" = 1.546 inch  
(39.26 mm)



M, T, W, and Z, Shank,  
8447, 10151, and 10152 blades  
"B" = 0.325 inch  
(8.26 mm)



Y Shank  
"B" = 2.063 inch  
(52.40 mm)

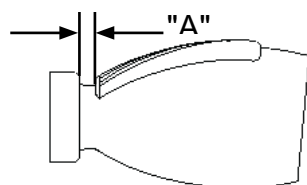


X and V Shank  
"B" = 0.190 inch  
(4.83 mm)

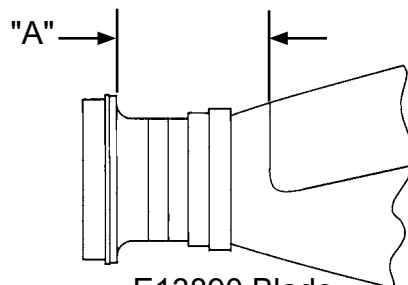
The illustrations above refer to the "A" dimension given in Table 3-3 for boot installation on a blade outside the hub.

For an assembled propeller, subtract the "B" dimension from the "A" dimension to locate the "C" dimension that is the corrected boot location from the outermost surface of the hub, counterweight clamp, or blade clamp, as applicable.

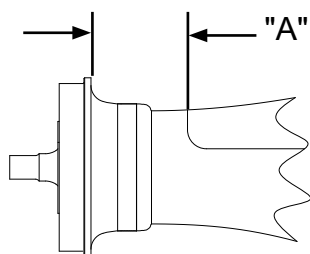
**De-ice Boot Location ("A", "B", and "C" Dimension) for Metal Blades**  
**Figure 3-2**



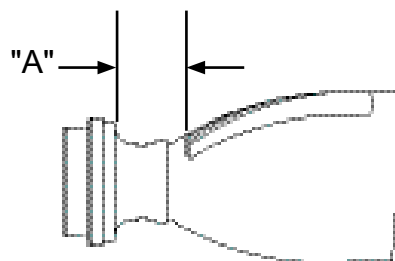
M and LM Shanks  
"B" = 0.325 inch (8.26 mm)



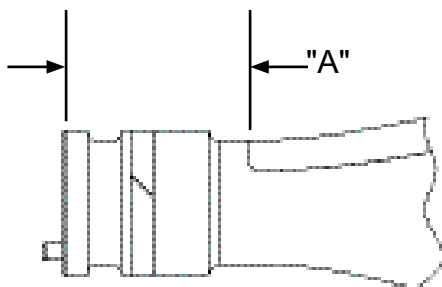
E13890 Blade  
"B" = 1.898 inches (48.20 mm)



"N" Shank  
"B" = 1.898 inches  
(48.20 mm)

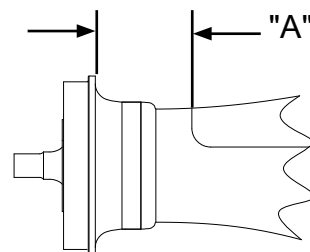


"A" and "E" Shanks and  
7890 Blades  
"B" = "A" as specified in Table 3-3



Bantam "A" Shank  
3 and 5-blade Propellers:  
"B" = 1.886 inches (47.90 mm)

2-blade Propellers:  
"B" = 1.918 inches (48.71 mm)



Raptor "C" Shank  
"B" = 1.685 inch (42.80 mm)

Raptor "D" Shank  
"B" = 1.670 inch (42.41 mm)

The illustrations above refer to the "A" dimension given in Table 3-3 for boot installation on a blade outside the hub.

For an assembled propeller, subtract the "B" dimension from the "A" dimension to locate the "C" dimension that is the corrected boot location from the outermost surface of the hub, counterweight clamp, or blade clamp, as applicable.

**De-ice Boot Location ("A", "B", and "C" Dimension) for Composite Blades**  
**Figure 3-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

<b>Blade Configuration</b>	<b>"A" Dimension (inches) - Bare Blade</b>	<b>Centerline Shift</b>	<b>Restrainer Strap</b>
78D01AB	3 1/2		
78D01B	3 1/2		
78D01B*2	3 1/2		
78D01BX*2	3 1/2		
7890B	Against Winding		
7890K	Against Winding		
7890K*1	Against Winding		
8447AB-12A	1 1/16		
8447AB-12R	1 1/16		
8447ANB-12A	1 1/16		
8447ANB-12R	1 1/16		
8447B-12A	1 1/16		
8447B-12R	1 1/16		
8447NB-12A	1 1/16		
8447NB-12R	1 1/16		
86DB01B	4 1/8		
91D15B	3 11/16		
10151B-8R	7/8		
10151NB-8R	7/8		
A10460EK	Against C'wt Clamp		
A10460K	Against C'wt Clamp		
D8292B	4 3/16		
D8292B*1	4 3/16		
D8292B-2	4 3/16		
D8292B-2*1	4 3/16		
D8295B-2	4 3/16		
D8990K	4 3/16		
D8990K*1	4 3/16		
D8990SB	4 3/16		
D8990SB*1	4 3/16		
D8990SK	4 3/16		
D8990SK*1	4 3/16		
D9290K	4 3/16		
D9290K*2	4 3/16		
D9290SK	4 3/16		
D9327K	4 11/16		
D9383K	4 3/16		

**De-ice Boot Location - "A" Dimension  
Table 3-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

Blade Configuration	"A" Dimension (inches) - Bare Blade	Centerline Shift	Restrainer Strap
D9390SK-1R	4 3/16		
D9391K	4 3/16		
D9510SK	4 3/16		
D9511FASK	4 3/16		
D9511FASK*1	4 3/16		
D9511FK	4 3/16		
D9511FK*1	4 3/16		
D9511FK*2	4 3/16	B	
D9511FK*3	4 3/16		
D9511FK*5	4 3/16		
D9511FK-2	4 3/16	B	
D9511FSK	4 3/16	B	
D9512AEK	4 3/16		
D9512AFK	4 3/16		
D9512AK	4 3/16		
D9515B*1	4		
D9515K	4 3/16		
D9515K*1	4 3/16		
D9515K*2	4 3/16		
D9690B	4 3/16	C	
D9900K	4 3/16		
E8190K	Against C'wt Clamp 1/8 inch maximum gap		
E8501B-3.5	4 3/16		
E8501B-3.5*1	4 3/16		
E8501K	4 11/16		
E8501K-3.5*1	4 3/16		
E9083SK	4 11/16		
E9083SK*1	3 15/16		
E9193B	1/16 to 1/8 Outboard From Clamp		
E9193K	1/16 to 1/8 Outboard From Clamp		
E9193K*2	1/16 to 1/8 Outboard From Clamp		

**CENTERLINE SHIFT SPECIFICATIONS**

"B" - Shift the marked centerline on the de-ice boot 0.70 inch toward the blade face

"C" - Shift the marked centerline on the de-ice boot 0.125 inch toward the blade face

**De-ice Boot Location - "A" Dimension  
Table 3-3, Continued**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

<b>Blade Configuration</b>	<b>"A" Dimension (inches) - Bare Blade</b>	<b>Centerline Shift</b>	<b>Restrainer Strap</b>
E9327K	4 3/16		
E9512CB-1	4 3/16		
E9512CB-1*1	4 3/16		
E9512CB-1*2	4 3/16		
E9512GB-1	4 3/16		
E9512GB-1*1	4 3/16		
E9512GB-1*2	4 3/16		
E9512GB-1*3	4 3/16		
E9512K	4		
E9512SK	4		
E9612K	3 13/16		
E9673SAK	3 13/16		
E10477K	4 5/8		
E10477K*1	4 5/8		
E10477SK	4 5/8		
E10478SK	4 1/2		
E10479SK	4 1/2		
E10950PB	Butted Against C'wt Clamp		
E10950PCB	Butted Against C'wt Clamp		
E10950PCK	Butted Against C'wt Clamp		
E10950PK	Butted Against C'wt Clamp		
E11990K	1/4 inch Outboard From C'wt Clamp		
E12902K	1/8 to 1/4 inch Outboard From C'wt Clamp		
E12903AK(X)	Butted Against C'wt Clamp		
E13890K	3 9/16		
F7498K	2 13/16		
F7498K*1	2 13/16		
F7498K-1	2 13/16		
F7663DB-6Q	3 3/4		With 4E1513(-) Bracket
F7663DB-6Q	3 3/4		With 2H1291 Restrainer Strap
F7663K-2R	2 13/16		
F7691B+2	2 3/8		
F7691DK-1 14 VOLT BOOT	3 5/16		7931-SMR6201 Restrainer Strap
F7691DK-1*1 28 VOLT BOOT	3 5/16		7931-SMR6201 Restrainer Strap
F7693DFB+2	2.375		

**De-ice Boot Location - "A" Dimension  
Table 3-3, Continued**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

<b>Blade Configuration</b>	<b>"A" Dimension (inches) - Bare Blade</b>	<b>Centerline Shift</b>	<b>Restrainer Strap</b>
F7693DFK	3 5/16		7931-SMR6201 Restrainer Strap
F7693DFK*1	2 9/16		
F7693FB*1	2 1/4		
F7693FB+2	2 3/8		
F7693FB+2*1	2 3/8		
F7693FB+2*2	2 5/16		
F7693FK+2	2 13/16		
F7498K-1	2 13/16		2H1291 Restrainer Strap
F8052K	4 5/16		2H1291 Restrainer Strap
F8068B	2 3/8		
F8068B*1	2 5/16		
F8068B-2	2 5/16		
F8068B-2*1	2 5/16		
F8068B*2	2 5/16		
F8068B*3	2 5/16		
F8068K*1	2 13/16		2H1291 Restrainer Strap
F8068K*2	2 13/16		2H1291 Restrainer Strap
F8068K-2*3	2 13/16		2H1291 Restrainer Strap
F8074K	3 5/16		2H1291 Restrainer Strap supersedes 7931-2E1291 Restrainer Strap
F8465B-7R	3 15/16		2H1291 Restrainer Strap supersedes 7931-2E1291 Restrainer Strap
F8465B-7R*1	3 15/16		2H1291 Restrainer Strap supersedes 7931-2E1291 Restrainer Strap
F8468AB-6R	3 1/16		2H1291 Restrainer Strap supersedes 7931-2E1291 Restrainer Strap
F8468AK-6R	2 13/16		2H1291 Restrainer Strap supersedes 7931-2E1291 Restrainer Strap
F8468AK-8R	2 13/16		2H1291 Restrainer Strap supersedes 7931-2E1291 Restrainer Strap
F8475B-4	2 13/16		2H1291 Restrainer Strap supersedes 7931-2E1291 Restrainer Strap
FC6660K*1	4 1/16		

**De-ice Boot Location - "A" Dimension  
Table 3-3, Continued**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

<b>Blade Configuration</b>	<b>"A" Dimension (inches) - Bare Blade</b>	<b>Centerline Shift</b>	<b>Restrainer Strap</b>
FC7391DK	3 13/16		
FC7391DK*1	3 13/16		
FC7391DK*2	3 13/16		
FC7391DK*3	3 13/16		
FC7451B	4 1/16		
FC7453B	4		
FC7453K	3 15/16		
FC7479B-2R	4		
FC7479B-2R*1	4 1/16		
FC7479B-2R*2	4		
FC7479K-2R	4		
FC7497DB	3 1/2		
FC7663B-2R	4		
FC7663B-2R*1	3 7/8		
FC7663B-5R	3 15/16		
FC7663DB-2Q	4		
FC7663DB-2R	4		
FC7663DB-2R*1	4		
FC7663DB-6Q	4		
FC7663DB-6Q*1	4		
FC7663DRB	4		
FC7663DRB*1	3 13/16		
FC7663DRK	3 3/4		
FC7663K-2R	3 13/16		
FC7666AB	3 11/16		
FC7666AB-2R	3 13/16		
FC7666AB-4*1	4 1/4		
FC7666CB-4*1	3 13/16		
FC7693DFB	3 13/16		
FC7693DFB+2	3 13/16		
FC7693DFK	4 1/4		
FC7693FB+1	3 15/16		
FC7693FB+1*1	3 15/16		
FC7818K	3 15/16		
FC7854K	4.312		
FC8459B-8R	3 13/16		
FC8459B-8R*1	3 13/16		

**De-ice Boot Location - "A" Dimension  
Table 3-3, Continued**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

<b>Blade Configuration</b>	<b>"A" Dimension (inches) - Bare Blade</b>	<b>Centerline Shift</b>	<b>Restrainer Strap</b>
FC8459B-8R*3	3 13/16		
FC8468B-3*1	3 13/16		
FC8468B-6R	4 1/16		
FC8468B-6R*1	3 3/4		
FC8468B-6R*2	3 13/16		
FC8468B-8Q	3 13/16		
FC8468B-8R	3 13/16		
FC8468B-8R*2	3 13/16		
FC8468DB-14*1	3 3/4		
FC8475B-4	3 13/16		
FC8475FK-6	3 15/16		
FC8475K-6	3 13/16	G	
FC8477AB-4*1	4 5/16		
FC8477B-4	3 13/16		
FC8477AB-6	4 5/16		
FC8477B-4*1	3 13/16		
FC8477B-6	3 13/16		
FC9587DB-7	3 13/16		
FJC6660K	4		
FJC7451B	4 1/16		
FJC7453K	3 15/16		
FJC7663B-2R	3 7/8		
FJC7663B-5R	3 15/16		
FJC7663DB-6Q	4		
FJC7666AB	3 11/16		
FJC7666AB-2R	3 13/16		
FJC7854K	4.312		
FJC8459B-8R	3 13/16		
FJC8459B-8R*1	3 13/16		
FJC8459B-8R*2	3 13/16		
FJC8459B-8R*3	4 1/16		
FJC8468B-6R	3 11/16		
FJC8468DB-14*1	3 3/4		
FJC8468DB-14*2	3 3/4		
GC11114K-2	4 1/8		
JE10991B	4		

**CENTERLINE SHIFT SPECIFICATIONS**

"G" - Shift the marked centerline on the de-ice boot 0.25 inch toward the blade face

**De-ice Boot Location - "A" Dimension  
Table 3-3, Continued**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

<b>Blade Configuration</b>	<b>"A" Dimension (inches) - Bare Blade</b>	<b>Centerline Shift</b>	<b>Restrainer Strap</b>
JE9782SB	4 3/16		
JNC10904B	4		
JNC10905B*1	4		
LM10585A(N)K+4	2 3/16		
LM11692NK*1	1 5/8		
LT10282AB+2.5	1 5/16		
LT10282AB+4	1 1/16		
LT10282ANB+2.5	1 5/16		
LT10282B+4	1 5/16		
LT10282B+4*1	1 1/16		
LT10282NB+4	1 5/16		
LT10282NSB-5.3R	13/16		
LT10282SB-5.3R	0.81		
LT10574FNSB*1	1 5/16		
LT10574FNSK	1 5/16		
LT10574FSB	1 5/16		
LT10574FSB*1	1 5/16		
LT10574FSK	1 5/16		
LT10673B	1 1/16		
LT10673B-2Q	1 1/16		
LT10673NB	1 1/16		
LT10876ANSB-2Q	1 1/16		
LT10876ASB-2Q	1 1/16		
LT10876NSB-2Q	1 1/16		
LT10876SB-2Q	1 1/16		
LT10890NK	1 5/16		
LT10891NK	1 5/16		
M9128NSAK*1	11/16		
M9128NSAK*2	11/16		
M9128NSK	11/16		
M10083K	1 5/16	H	
M10282AB+6	11/16		
M10282AB+6*1	11/16		
M10282ANB+6	11/16		
M10282ANB+6*1	11/16		
M10476K	13/16		

**CENTERLINE SHIFT SPECIFICATIONS**

"H" - Shift the marked centerline on the de-ice boot 0.25 inch toward the blade camber

**De-ice Boot Location - "A" Dimension  
Table 3-3, Continued**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

<b>Blade Configuration</b>	<b>"A" Dimension (inches) - Bare Blade</b>	<b>Centerline Shift</b>	<b>Restrainer Strap</b>
M10476K*1	13/16		
M10476NK	13/16		
M10476NK*1	13/16		
M10476NSK	13/16		
M10476NSK*1	13/16		
M10876ANSB	11/16		
M10876ANSK	11/16		
M10876ANSK*1	11/16		
M10876ANSK*4	17/32		
M10876ASK	11/16		
M10876ASK*2	11/16		
M10876NSB	11/16		
M10876NSK	11/16		
M10876SB	11/16		
M10877K	1 11/16		
M11276K	11/16		
M11276NK	11/16		
M11276NK-3	2 5/16		
M11276NSK	11/16		
M11691NK	1 11/16		
M11691NSK	11/16		
M11691NSK*1	13/16	C	
M11691NSK*2	1 3/8		
M11692NSK	2 5/16		
MV7636NB-2R	2 7/16		
MV7636NB-2R*1	2 3/16		
MV8833NB-2	2 1/8		
MV9333NB	1 13/16		
N7605CK	2 5/8		2H1291 Restrainer Strap
N7605CK+2*1	2 5/8		2H1291 Restrainer Strap
N7605K+2	2 5/8		
NC8834K	3 7/16		
NC8834K*1	3 7/16		
NC9208K	3 5/8		
NC10245B	3 5/16		

**CENTERLINE SHIFT SPECIFICATIONS**

"C" - Shift the marked centerline on the de-ice boot 0.125 inch toward the blade face

**De-ice Boot Location - "A" Dimension  
Table 3-3, Continued**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

<b>Blade Configuration</b>	<b>"A" Dimension (inches) - Bare Blade</b>	<b>Centerline Shift</b>	<b>Restrainer Strap</b>
NC10245B*1	3 5/16		
NC10245B*2	3 5/16		
NC10245B*3	3 5/16		
NC10245B*4	3 5/16		
NC10245B*5	3 5/16		
NC10245B*6	3 5/16		
NC10320K	3 5/16		
NC10320K*1	3 5/16		
NC10320K*2	3 5/16		
NC10445K-2	3 5/16		
NM8410K-4	2 5/8		
T8290NKX	1 5/16		
T9212B	13/16		
T9212DNK-7	9/16	D	
T9212K-2*1	9/16		
T9212NB	13/16		
T9212NK-2	11/16		
T9212NK-2*1	9/16		
T10173AB-6Q	1 3/8		
T10173ANB-6Q	1 3/8		
T10173ANB-12.5	1 5/16		
T10173ANK-12.5	1 5/16		
T10173B-3	1 5/16		
T10173B-8	1 3/8		
T10173B-11R	11/16		
T10173CK	1 5/16		
T10173CK-8	1 5/16		
T10173CNK-8	1 5/16		
T10173DNB-6Q	1 5/16		
T10173E+1	1 3/8		
T10173E-8	1 3/8		
T10173E-11	1 3/8		
T10173FK-10.5	13/16		
T10173FNB-10.5	13/16		
T10173FNB-12.5	13/16		
T10173FNB-12.5*1	1 5/16		

**CENTERLINE SHIFT SPECIFICATIONS**

"D" - Shift the marked centerline on the de-ice boot 0.55 inch toward the blade face

**De-ice Boot Location - "A" Dimension  
Table 3-3, Continued**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

<b>Blade Configuration</b>	<b>"A" Dimension (inches) - Bare Blade</b>	<b>Centerline Shift</b>	<b>Restrainer Strap</b>
T10173FNK-10.5	13/16		
T10173FNK-11R	13/16		
T10173FNK-12.5	13/16		
T10173FNK-12.5*1	1 5/16		
T10173K-8	1 5/16		
T10173K-11R	1 5/8		
T10173NB-3	1 5/16		
T10173NB-8	1 3/8		
T10173NB-13Q	1 3/8		
T10173NE+1	1 3/8		
T10173NE+1*1	1 3/8		
T10173NE-8	1 3/8		
T10173NE-11	1 3/8		
T10173NK-8	1 5/16		
T10173NK-17	1 5/16		
T10176NSB-5	1 5/16		
T10176SB-5	1 3/8		
T10178B-3R	1 3/8		
T10178B-5Q	1 5/16		
T10178B-5Q*1	1 5/16		
T10178B-8R	2		
T10178B-8R*1	1 5/16		
T10178B-10Q	1 3/8		
T10178B-11	1 5/16		
T10178B-11R	1 3/8		
T10178B-13Q	1 1/16		
T10178B-13R*1	2		
T10178CK	1 5/16		
T10178CNK	1 5/16		
T10178CNRK	1 5/16		
T10178CRK	1 5/16		
T10178NB-3R	1 3/8		
T10178NB-5	1 3/8		
T10178NB-5Q*1	1 5/16		
T10178NB-8R	2		
T10178NB-8R*1	1 5/16		
T10178NB-11	1 15/16		
T10178NB-11R	1 3/8		

**De-ice Boot Location - "A" Dimension  
Table 3-3, Continued**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

<b>Blade Configuration</b>	<b>"A" Dimension (inches) - Bare Blade</b>	<b>Centerline Shift</b>	<b>Restrainer Strap</b>
T10178NB-13Q	1 1/16		
T10178NB-13R*1	2		
T10178NK-3R	1 5/16		
T10178NK-8R	1 5/16		
T10178NSB-11R	1 3/8		
T10282B	2		
T10282B*1	1 5/16		
T10282B*2	1 3/8		
T10282B-6	1 5/16		
T10282B-9.5	1 5/16		
T10282DNB-4R	2		
T10282NB	2		
T10282NB*1	1 5/16		
T10282NB*2	1 3/8		
T10282NB-6	1 5/16		
T10282NK+4	1 5/16		
T10282NRB	1 3/8		
T10282NSK+4	1 5/16		
T10282RB	1 3/8		
T10290NK+2	1 5/16		
T10290NK+2*1	1 5/16		
T10702NK	7/8		
T10890CNK-2	1 5/16		
T10890CNK-2*1	1 5/16		
T10890CNK-2*2	1 5/16	I	
V7636NB	3/4		
V8433NB-10	3/4		
W8447AB-12A	1 1/16		
W8447AB-12R	1 1/16		
W8447ANB-12A	1 1/16		
W8447ANB-12R	1 1/16		
W8447B-12A	1 1/16		
W8447NB-12A	1 1/16		
W10151B-8R	7/8		
W10151NB-8R	7/8		

**CENTERLINE SHIFT SPECIFICATIONS**

"I" - Shift the marked centerline on the de-ice boot 0.3125 inch toward the blade face

**De-ice Boot Location - "A" Dimension  
Table 3-3, Continued**

C. Determine the Boot Location on the Blade

- (1) Use the applicable Figure to determine the location of Dimension "A".
  - (a) Metal blades: Refer to Figure 3-2 for blade shank illustrations showing the location of Dimension "A".
  - (b) Composite blades: Refer to Figure 3-3 for blade shank illustrations showing the location of Dimension "A".
- (2) For a blade that is not installed in the hub, mark the distance to the inboard edge of the boot (Dimension "A") on the leading edge of the blade.
  - (a) Use Table 3-3 to determine the specific Dimension "A" for the blade configuration.
  - (b) The boot location (Dimension "A") has a tolerance of  $\pm 0.062$  inch (1.58 mm).
- (3) For a blade that is installed in the hub, mark the distance from the hub or blade clamp to the inboard edge of the boot (Dimension "C") on the leading edge of the blade.
  - (a) Use Table 3-3 to determine the specific Dimension "A" and Dimension "B" for the blade configuration.
    - 1 The boot location ("A" or "B" dimension) has a tolerance of  $\pm 0.062$  inch (1.58 mm).
  - (b) Calculate Dimension "C" by subtracting Dimension "B" from Dimension "A" (example: Dimension "A" - Dimension "B" = Dimension "C")
- (4) Locate the leading edge by sighting up the leading edge from the blade tip to the blade shank.
  - (a) Using a crayon or a soft non-graphite pencil CM162 or equivalent, make a centerline mark on the blade shank in line with the leading edge centerline.

## 6. Installing a De-ice Boot on a Metal Blade

### A. Blade Preparation

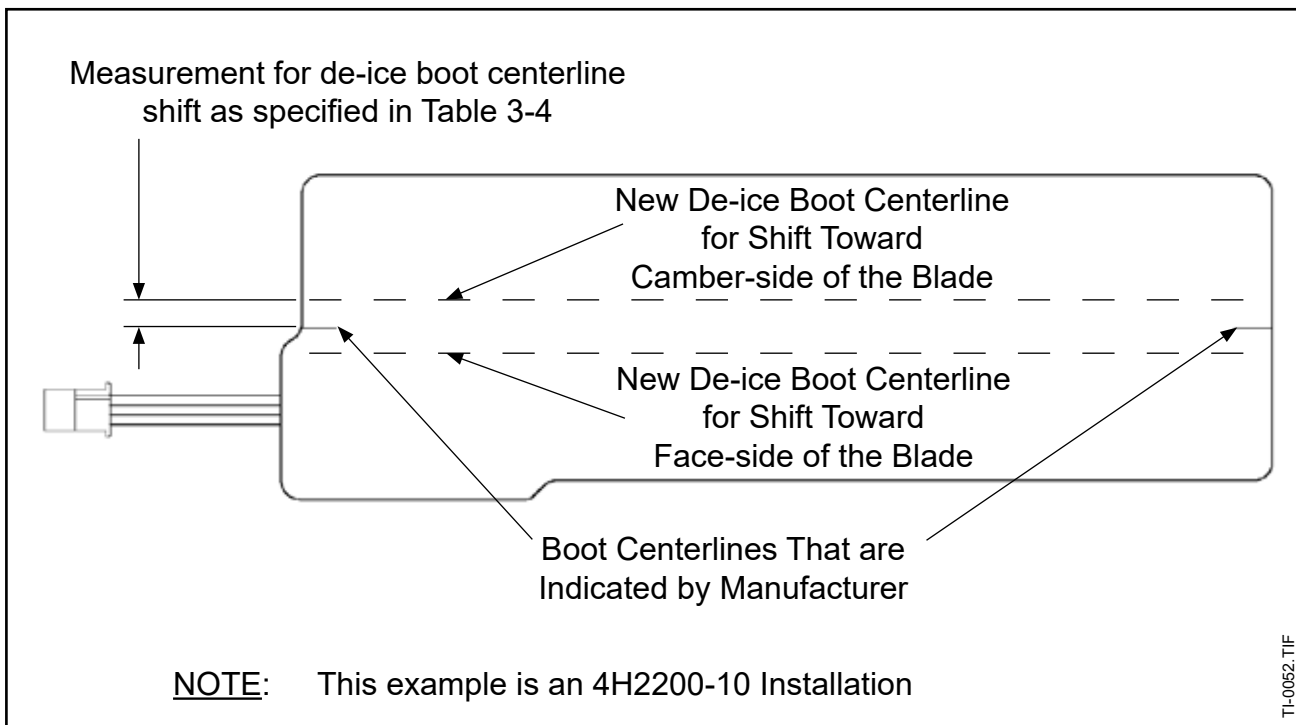
**CAUTION:** CLEANLINESS IS NECESSARY FOR PROPER ANTI-ICING BOOT ADHESION. ALL SOLVENTS MUST BE FREE OF CONTAMINANTS. BRUSHES AND CLOTHS MUST BE CLEAN AND LINT FREE. DO NOT TOUCH SURFACES AFTER THEY HAVE BEEN PREPARED FOR THE ANTI-ICING BOOT INSTALLATION.

- (1) If blade is not installed in the hub:
  - (a) For Y, D, and E shank blades, apply masking material to the blade seal or Teflon<sup>®</sup> area.
  - (b) For all other blades, apply masking material to the retention radius.
- (2) Put the boot on the blade with the inboard edge of the boot aligned with the "A" or "C" dimension mark.
  - (a) Refer to the section, "Determine the Boot Location on the Blade" in this chapter to determine the correct "A" or "C" dimension.
- (3) Most de-ice boots have a centerline indication marked with silver ink. Some older designs have a scribed line or a raised area at the inboard and outboard edges on the breeze (exposed) side to indicate the centerline of the de-ice boot. If a de-ice boot has a centerline indication, use this as the indicated centerline.
- (4) For blades that do not have de-ice boot shift information specified in Table 3-3, put the boot on the blade so that the indicated centerline of the boot is aligned with the blade shank and leading edge centerlines.
  - (a) If an indicated centerline mark is not provided on the boot, find the center of the boot and mark centerline indications on the breeze (exposed) side at the inboard and outboard edges of the boot.
  - (b) Using a straight edge, connect the marks at the inboard and outboard edges of the boot on the breeze (exposed) side to show the indicated centerline.



- (5) For blades that have de-ice boot centerline shift information specified in the Table 3-3, mark the de-ice boot to show a new shifted centerline. Refer to Figure 3-4.
- (a) If an indicated centerline mark is not provided on the boot, find the center of the boot and mark centerline indications on the breeze (exposed) side at the inboard and outboard edges of the boot.
  - (b) Using the distance and direction specified for the de-ice boot centerline shift in the Table 3-3, measure out from the manufacturer's indicated centerline to identify the new shifted centerline.
  - (c) Make marks on the breeze (exposed) side on the inboard and outboard edges of the de-ice boot that show the new shifted centerline that was identified in the previous step.
  - (d) Using a straight edge, connect the marks at the inboard and outboard edges of the de-ice boot on the breeze (exposed) side to make a new centerline.
  - (e) Put the de-ice boot on the blade so that the new shifted de-ice boot centerline is aligned with the blade shank and leading edge centerlines.

**NOTE:** The new centerline causes the entire de-ice boot to shift toward the face or camber side of the blade, as applicable.



**Marking the De-ice Boot for Centerline Shift  
Figure 3-4**

- (6) Fold the boot over the blade and hold it in position.
- (7) Using a non-graphite pencil, mark a line approximately 0.5 inch (12.7 mm) away from the boot around the entire perimeter, except at the shank.
- (8) Remove the de-ice boot and apply masking material to protect the area outside of the marking. Refer to Figure 3-5.

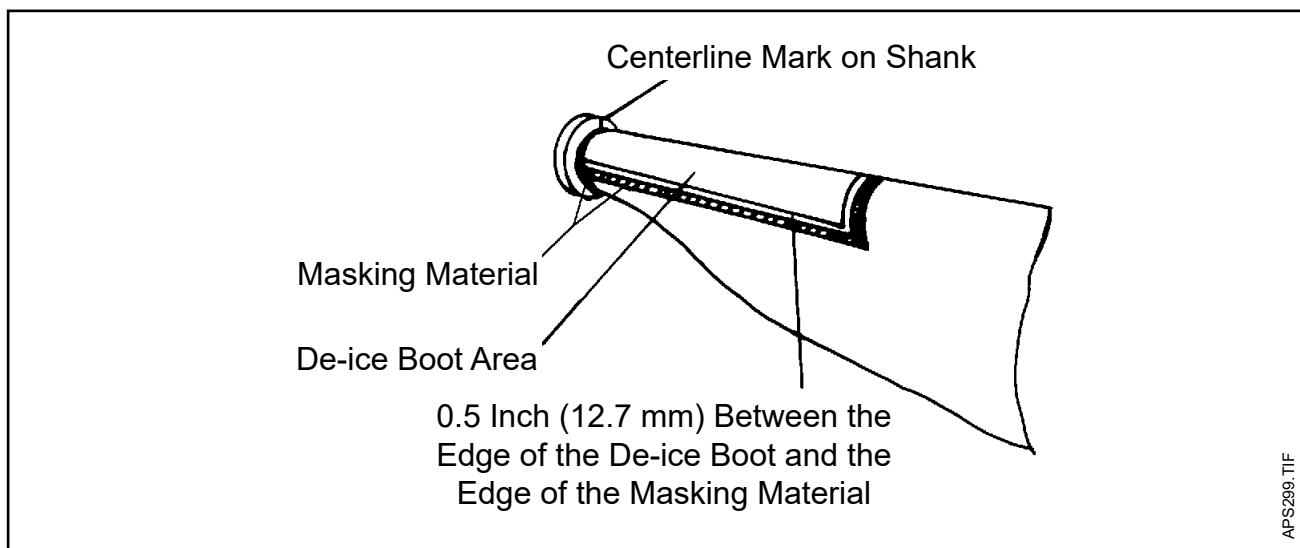
**CAUTION:** DO NOT EXPOSE THE BASE METAL OF THE BLADE.

- (9) If the blade has been painted, lightly sand the area where the boot will be installed using 120 to 160 grit sandpaper.

**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:** USE ONLY MEK CM106, MPK CM219, OR TOLUENE CM41 BECAUSE OTHER CLEANING SOLVENTS MAY ADVERSELY AFFECT PAINTED SURFACES.

- (10) Using solvent MEK CM106, MPK CM219, or toluene CM41, clean inside the masked area and the contacting surface of the de-ice boot.
- (11) Permit the surface to dry, or, using a clean, lint-free cloth, wipe the surface dry.



**Masking De-ice Boot Location on the Blade  
Figure 3-5**

B. Adhesive Application

**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:** THE BLADE AND DE-ICE BOOT CONTACTING SURFACES TO BE BONDED MUST BE THOROUGHLY AND COMPLETELY COVERED WITH ADHESIVE. TWO LAYERS OF ADHESIVE ARE REQUIRED. DO NOT APPLY ADHESIVE OR INSTALL THE DE-ICE BOOT IF THE RELATIVE HUMIDITY IS ABOVE 90 PERCENT OR IF THE TEMPERATURE IS BELOW 50° F (10° C). FOR BEST RESULTS, APPLY ADHESIVE AND PERFORM DE-ICE BOOT INSTALLATION AT TEMPERATURES BETWEEN 65-75°F (19-23°C), WITH RELATIVE HUMIDITY EQUAL TO OR LESS THAN 90 PERCENT. CURING TIMES VARY WITH TEMPERATURE AND RELATIVE HUMIDITY. IF RELATIVE HUMIDITY IS BETWEEN 75-90 PERCENT, PERMIT ADDITIONAL CURING TIME. WHEN ADHESIVE IS APPLIED AT TEMPERATURES BELOW 65°F (19° C), THE BOND STRENGTH IS DIMINISHED REGARDLESS OF THE LENGTH OF CURING TIME.

- (1) Verify that the correct boot is being installed. Refer to Hartzell Propeller Application Guide Manual 159 (61-02-59).
  - (a) Refer to Hartzell Propeller Service Letters HC-SL-30-260 and HC-SL-30-279 for additional approved de-ice boots manufactured by Hartzell Propeller LLC.
- (2) Measure the electrical resistance of the de-ice boot.
  - (a) Using an Ohm meter, measure the resistance of the de-ice boot.
    - 1 Hartzell Propeller LLC recommends using an Ohm meter that shows resistance readings to at least three decimal places.
  - (b) Compare the resistance measurement to the resistance values listed in Table 3-5 in the "Resistance Values" section of this chapter.
  - (c) If the resistance measurement is not within the resistance values specified, replace the de-ice boot.

- (3) Using solvent MEK CM106, MPK CM219, or toluene CM41, moisten a clean, lint-free cloth.
- (4) Clean the bond side of the boot and the strap, if applicable, changing the side of the cloth frequently to avoid contamination of the surface.
- (5) Permit the surface to air dry.

**CAUTION:** DO NOT INSTALL THE DE-ICE BOOT UNTIL THE PAINT HAS CURED FOR A MINIMUM OF EIGHT HOURS.

- (6) Cure the paint for a minimum of eight hours before beginning the de-ice boot installation procedure.
- (7) There are three different adhesive options available for de-ice boot and/or lead strap installation.

(a) Adhesive Application, Option A

- 1 Mix adhesive CM10 thoroughly
- 2 Apply one even layer of adhesive CM10 to the de-ice boot, to 1.5 inches (38.1 mm) of the lead strap if applicable, and to the masked area of the blade where the de-ice boot will be installed.
- 3 Permit the adhesive CM10 to dry a minimum of one hour.
- 4 Apply a second even layer of adhesive CM10 to the de-ice boot, to 1.5 inches (38.1 mm) of the lead strap if applicable, and to the masked area of the blade where the first layer of the adhesive mixture was applied.
- 5 Permit the surfaces to dry until the adhesive is slightly sticky to the touch (as if touching the glue-side of masking tape).

(b) Adhesive Application, Option B

- 1 Stir primer CM57 thoroughly.
- 2 Apply one even layer of primer CM57 to the masked area of the blade where the de-ice boot will be installed.
- 3 Permit the primer CM57 to air dry for a minimum of one hour before applying the adhesive mixture.

**CAUTION: THOROUGHLY STIR ADHESIVE CURING AGENT BEFORE MIXING IT WITH THE ADHESIVE BECAUSE THE INGREDIENTS OF THE CURING AGENT MAY HAVE SEPARATED.**

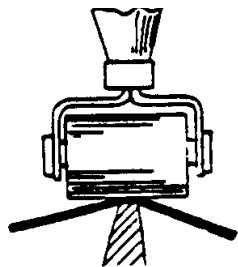
- 4 Mixing Instructions for CM114-1
  - (1) Mix 9 parts adhesive CM79 with 1 part adhesive curing agent CM114-1 by volume. Thoroughly mix until a consistent color tone is present.
- 5 Mixing Instructions for CM114-2
  - (1) Mix 2 parts curing agent CM114-2 to 100 parts adhesive CM79 by weight. Thoroughly mix until a consistent color tone is present.
- 6 Apply one even layer of the adhesive mixture to the bond-side of the de-ice boot, to 1.5 inches (38.1 mm) of the lead strap if applicable, and to the masked area of the blade where primer CM57 was applied.
- 7 Permit the adhesive mixture to air dry for a minimum of one hour.
- 8 Apply a second layer of the adhesive mixture to the bond-side of the de-ice boot, to 1.5 inches (38.1 mm) of the lead strap if applicable, and to the masked area of the blade where the first layer of the adhesive mixture was applied.
- 9 Permit the surfaces to dry until the adhesive is slightly sticky to the touch (as if touching the glue-side of masking tape).

(c) Adhesive Application, Option C

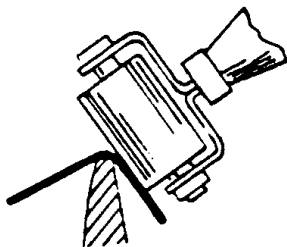
- 1 Stir primer CM216 thoroughly.
- 2 Apply one even layer of primer CM216 to the masked area of the blade where the de-ice boot will be installed.
- 3 Permit the primer CM216 to air dry for a minimum of one hour before applying the adhesive mixture.

**CAUTION: THOROUGHLY SHAKE THE CONTAINER OF ADHESIVE CURING AGENT CM218 BEFORE MIXING IT WITH THE ADHESIVE BECAUSE THE INGREDIENTS OF THE CURING AGENT MAY HAVE SEPARATED.**

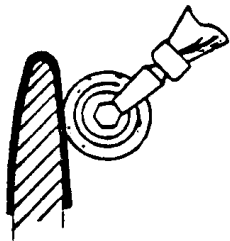
- 4 Mix adhesive CM217 with the adhesive curing agent CM218 in accordance with the manufacturer's technical data sheet. Thoroughly mix until a consistent color tone is present.
- 5 Apply one even layer of the adhesive mixture to the bond-side of the de-ice boot, to 1.5 inches (38.1 mm) of the lead strap if applicable, and to the masked area of the blade where primer CM216 was applied.
- 6 Permit the adhesive mixture to air dry for a minimum of one hour.
- 7 Apply a second layer of the adhesive mixture to the bond-side of the de-ice boot, to 1.5 inches (38.1 mm) of the lead strap if applicable, and to the masked area of the blade where the first layer of the adhesive mixture was applied.
- 8 Permit the surfaces to dry until the adhesive is slightly sticky to the touch (as if touching the glue-side of masking tape).
- 9 Tack life is 10 to 20 minutes.



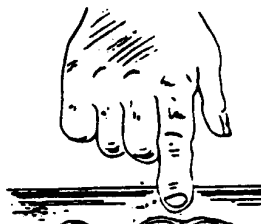
Step 1 Roll firmly along the centerline with a wood or rubber roller.



Step 2 Gradually tilt the roller and carefully work the de-ice boot over each side of the blade contour.



Step 3 Roll outward from the centerline to the edges.



Step 4 If excess material at the edges puckers, work out smoothly and carefully with fingers.

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**Rolling the De-ice Boot onto the Blade**  
**Figure 3-6**

### C. De-ice Boot Installation

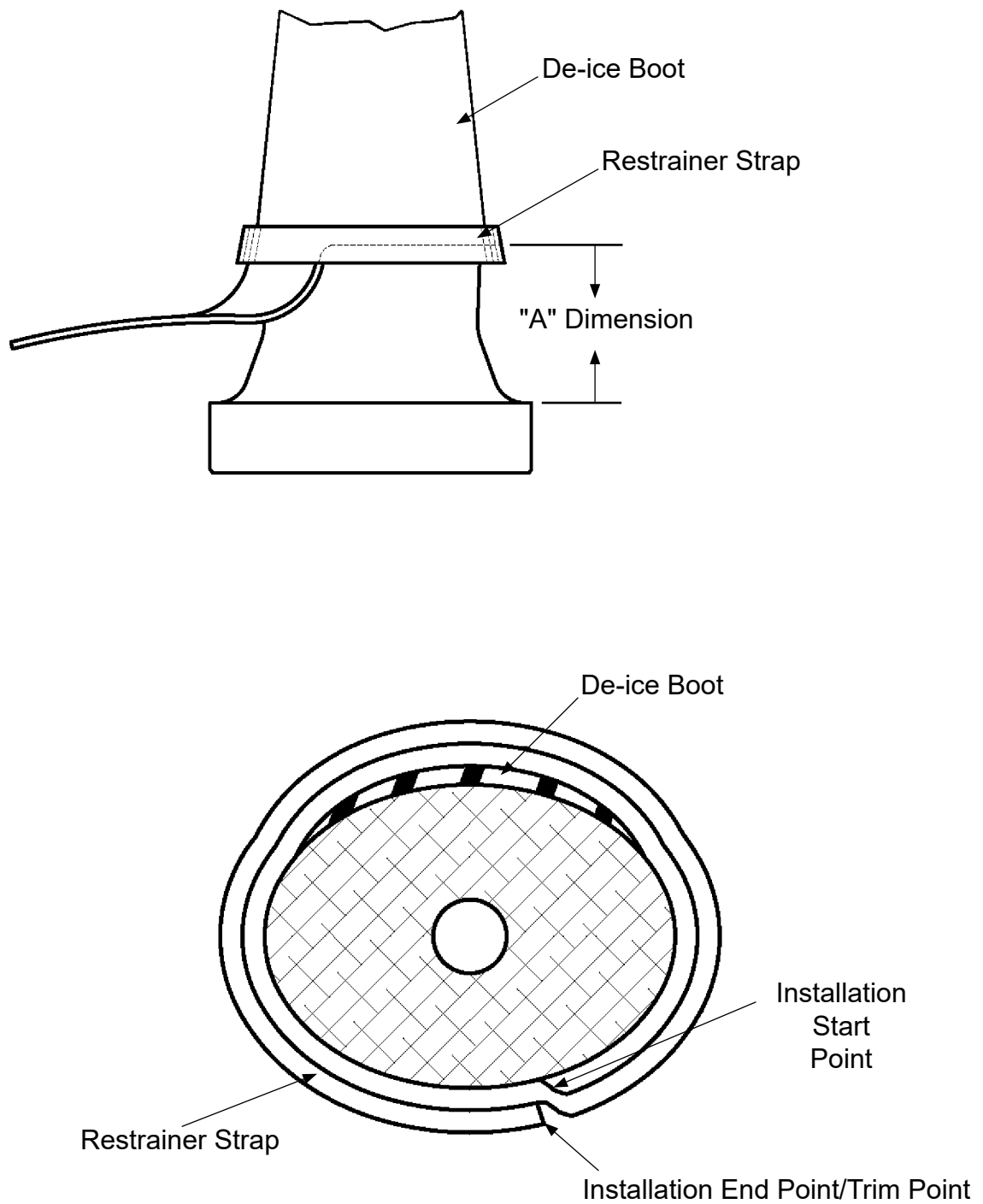
**CAUTION:** THE BONDING SURFACES MUST BE THOROUGHLY COVERED WITH ADHESIVE. TWO LAYERS OF ADHESIVE ARE REQUIRED.

- (1) When the adhesive layers are sticky to the touch, begin putting the boot on the shank end of the blade.
  - (a) Line up the inboard end of the boot with the "A" or "C" dimension reference line and the centerline mark on the blade.
    - 1 Refer to the section, "Determine the Boot Location on the Blade" in this chapter.
  - (b) Working outward toward the tip of the blade, tack the boot centerline to the leading edge of the blade. If the centerline gets out of alignment, pull up with a quick motion and reapply the boot.
  - (c) If the adhesive is removed from either surface, completely remove the boot and reapply adhesive in accordance with the step 6.B.(7).
  - (d) When using Adhesive Application, Option A or Option B: if the surface becomes too dry, the adhesive may be reactivated by lightly applying solvent MEK CM106, Toluene CM41, acetone CM11, or MPK CM219 to the adhesive.

**CAUTION:** DO NOT REACTIVATE THE ADHESIVE WHEN USING ADHESIVE APPLICATION, OPTION C.

- (e) When using Adhesive Application, Option C: near the end of the tack life, the adhesive may appear to be dry, but is still active and does not require reapplication or reactivation.
- (2) When the boot is correctly positioned, roll firmly along the centerline with a an appropriate roller. Refer to Figure 3-6.
  - (a) Gradually tilt the roller and carefully work the boot over each side of the blade contour.
  - (b) Avoid trapping air beneath the boot.
- (3) Roll outward from the centerline to the edges. Refer to Figure 3-6.
  - (a) Work out excess material at the outboard edge on the centerline of the boot before the other edges are completely rolled down.
  - (b) If excess material at the edges puckers, work out smoothly and carefully with fingers.
- (4) Roll down the tapered edges of the boot using the edge of the roller.
- (5) After the boot is installed, permit the adhesive to dry a minimum of eight hours before applying the filler, if applicable.





TI-0100  
TI-0101

**Restrainer Strap Installation**  
**Figure 3-7**

#### D. Restrainer Strap Installation

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

**CAUTION:** THE BLADE AND DE-ICE BOOT SURFACES TO BE BONDED, MUST BE CONSISTENTLY AND EVENLY BONDED. FOR BEST RESULTS APPLY ADHESIVE AND PERFORM DE-ICE BOOT INSTALLATION AT TEMPERATURES BETWEEN 65-75°F (18-24°C), WITH RELATIVE HUMIDITY LESS THAN 75%. IF RELATIVE HUMIDITY IS BETWEEN 75-90%, PERMIT ADDITIONAL DRYING TIME. IF ADHESIVE IS APPLIED AT TEMPERATURES BELOW 65°F (18° C), THE BOND STRENGTH IS DIMINISHED REGARDLESS OF THE LENGTH OF DRYING TIME. IF RELATIVE HUMIDITY IS HIGHER THAN 90% OR THE TEMPERATURE IS BELOW 50°F (10° C), INSTALLATION IS NOT RECOMMENDED.

##### (1) General

- (a) To determine if a restrainer strap is required for the application, refer to Table 3-3.
- (b) For best results, apply adhesive at room temperature (65 - 75° F [18-24°C]). Drying time will vary with temperature and relative humidity.
- (c) A restrainer strap may be installed on a blade while it is installed in the hub.
  - 1 The propeller blade being serviced must be positioned in a manner to prevent the contamination of other propeller components.

##### (2) Restrainer Strap Installation Procedure

- (a) Determine where the restrainer strap will be located. Refer to Figure 3-7 and Table 3-3.
- (b) Using a clean cloth dampened with solvent toluene CM41, MEK CM106, or MPK CM219, thoroughly clean both sides of the restrainer strap and a 2 inch (51 mm) area of the blade where the restrainer strap will be located.
  - 1 The approximately 1.5 inch (38 mm) area of the blade where the restrainer strap will be located includes the blade shank, the de-ice boot, and the lead strap, if applicable.

**CAUTION:** DO NOT SAND THE DE-ICE BOOT OR LEAD STRAP OR EXPOSE THE ALUMINUM BLADE BASE MATERIAL.

- (c) For SMR6201 Restrainer Strap Only: Using 120-160 grit sandpaper, lightly sand the painted surface of the blade shank where the restrainer strap will be located.
- (d) There are three different adhesive options available for restrainer strap installation.

**1** Adhesive Application, Option A

- a** Mix adhesive CM10 thoroughly.
- b** Apply one even layer of adhesive CM10 to the approximately 1.5 inch (38 mm) area where the restrainer strap will be located, including the de-ice boot and the lead strap, if applicable.
- c** Apply one even layer of the adhesive CM10 to the surface to be bonded on both sides of the restrainer strap.
- d** Permit the adhesive CM10 to dry a minimum of one hour.
- e** Apply a second even layer of adhesive CM10 to the approximately 1.5 inch (38 mm) area where the restrainer strap will be located, including the de-ice boot and the lead strap if applicable.
- f** Apply a second even layer of adhesive CM10 to the surface to be bonded on both sides of the restrainer strap.
- g** Permit the surfaces to dry until the adhesive is slightly sticky to the touch.

**2 Adhesive Application, Option B**

- a** Stir primer CM57 thoroughly.
- b** Apply one even layer of the primer CM57 to the approximately 1.5 inch (38 mm) area of the blade where the restrainer strap will be located, including the de-ice boot and the lead strap if applicable.
- c** Permit the primer CM57 to air dry for a minimum of one hour before applying the adhesive mixture.

**CAUTION: THOROUGHLY STIR ADHESIVE CURING AGENT BEFORE MIXING IT WITH THE ADHESIVE BECAUSE THE INGREDIENTS OF THE CURING AGENT MAY HAVE SEPARATED.**

- d** Mixing Instructions for CM114-1
  - (1)** Mix 9 parts adhesive CM79 with 1 part adhesive curing agent CM114-1 by volume. Thoroughly mix until a consistent color tone is present.
- e** Mixing Instructions for CM114-2
  - (1)** Mix 2 parts curing agent CM114-2 to 100 parts adhesive CM79 by weight. Thoroughly mix until a consistent color tone is present.
- f** Apply one even layer of the adhesive mixture to the approximately 1.5 inch (38 mm) area where the restrainer strap will be located, including the de-ice boot and the lead strap if applicable.
- g** Apply one even layer of the adhesive mixture to the surface to be bonded of the restrainer strap.
- h** Permit the adhesive mixture to air dry for a minimum of one hour.
- i** Apply a second layer of the adhesive mixture to the bond-side of the de-ice boot, to 1.5 inches (38.1 mm) of the lead strap if applicable, and to the masked area of the blade where the first layer of the adhesive mixture was applied.
- j** Apply a second even layer of the adhesive mixture to the surface to be bonded on both sides of the restrainer strap.
- k** Permit the surfaces to dry until the adhesive is slightly sticky to the touch (as if touching the glue-side of masking tape).

- 3**    **Adhesive Application, Option C**
- a**    Stir primer CM216 thoroughly.
  - b**    Apply one even layer of the primer CM216 to the approximately 1.5 inch (38 mm) area of the blade where the restrainer strap will be located, including the de-ice boot and the lead strap if applicable.
  - c**    Permit the primer CM216 to air dry for a minimum of one hour before applying the adhesive mixture

**CAUTION:** THOROUGHLY SHAKE THE CONTAINER OF ADHESIVE CURING AGENT CM218 BEFORE MIXING IT WITH THE ADHESIVE BECAUSE THE INGREDIENTS OF THE CURING AGENT MAY HAVE SEPARATED.

- d**    Mix adhesive CM217 with the adhesive curing agent CM218 in accordance with the manufacturer's technical data sheet. Thoroughly mix until a consistent color tone is present.
- e**    Apply one even layer of the adhesive mixture to the to the 2 inch (51 mm) area where the restrainer strap will be located, including the de-ice boot and the lead strap if applicable.
- f**    Permit the adhesive mixture to air dry for a minimum of one hour.
- g**    Apply a second layer layer of the adhesive mixture to the 2 inch (51 mm) area where the restrainer strap will be located, including the de-ice boot and the lead strap if applicable.
- h**    Permit the surfaces to dry until the adhesive is slightly sticky to the touch (as if touching the glue-side of masking tape).
- i**    Tack life is 10 to 20 minutes.

(e) Install the restrainer strap.

- 1 With the restrainer strap centered at the "A" dimension, begin the installation approximately 180 degrees from the de-ice boot lead strap.
- 2 Wrap the restrainer strap around and make a double thickness and trim, as indicated in Figure 3-7.
- 3 If the restrainer strap becomes misaligned, pull-up with a quick motion and reapply.
- 4 If the adhesive is removed from either surface, reapply the adhesive and permit to dry until the adhesive is slightly sticky to the touch before continuing the application of the restrainer strap.
- 5 When using Adhesive Application, Option A or Option B: if the adhesive becomes too dry, it may be reactivated by lightly applying solvent MEK CM106, MPK CM219, toluene CM41, or acetone CM11 to the adhesive.

**CAUTION: DO NOT REACTIVATE THE ADHESIVE WHEN USING ADHESIVE APPLICATION, OPTION C.**

- 6 When using Adhesive Application, Option C: near the end of the tack life, the adhesive may appear to be dry, but is still active and does not require reactivation.
- 7 Using roller TE328, or equivalent, firmly roll the restrainer strap, using care to avoid trapping air under the restrainer strap or damaging the threaded electrical connections.
  - a Move along the center to the side edges to work down the restrainer strap.
  - b Work out any air pockets, material puckers or waves in the restrainer strap material.
- 8 Permit the restrainer strap installation to dry (cure) a minimum of 8 hours.
- 9 Apply filler in accordance with the section "Filler Application" in this chapter

E. Inspection

**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.

**CAUTION:** MAKE SURE THAT THE DE-ICE BOOT APPLICATION HAS CURED A MINIMUM OF 8 HOURS BEFORE INSPECTING.

- (1) Make sure that the de-ice boot and the restrainer strap, if applicable, are in the proper position. Refer to Figure 3-2 and Table 3-3.
  - (a) Examine the de-ice boot and restrainer strap, if applicable, for proper distance from the shank of the blade.
- (2) After the installation has cured a minimum of 8 hours, at 50° F (10° C) or above visually inspect the entire edge of the de-ice boot and restrainer strap, if applicable, to make sure that it has correctly bonded to the blade.
- (3) Make an inspection of the bond of the edges of the de-ice boot and restrainer strap, if applicable.
  - (a) Using a thumb with moderate pressure and a twisting motion, verify the bond.
  - (b) If there is a loose area, bond as necessary using the same adhesive that was initially used for the installation.
  - (c) Using an appropriate roller, roll the area where the adhesive was reapplied and permit to cure before making another inspection.
    - 1 If the adhesive was reapplied to an area where the filler will be applied, permit the adhesive to dry for a minimum of 8 hours before applying the filler.
  - (d) Make another inspection of the bond of the edges of the de-ice boot and restrainer strap, if applicable.
  - (e) If there is a loose area, repeat steps 6.E.(3)(a) through 6.E.(3)(d).
  - (f) When the bond of the edges of the de-ice boot and restrainer strap, if applicable, is satisfactory, continue to the next step.
- (4) Measure the electrical resistance of each electric de-ice boot. For resistance values, refer to Table 3-5 in the "Resistance Values" section of this chapter.

F. Filler Application

- (1) Apply filler in accordance with the section, "Filler Application" in this chapter.

G. Paint Sealer Application

**CAUTION:** USE PAINT SEALER ON EVERY DE-ICE BOOT TO PROTECT THE ADHESIVE BOND LINE AND PREVENT BLADE CORROSION UNDER THE DE-ICE BOOT.

- (1) The paint sealer for a de-ice boot is Mixture Number 5. Refer to the "Material Information" section in this chapter for mixture requirements.
- (2) Apply paint sealer on each de-ice boot and restrainer strap if applicable, to prevent contamination of the bond surfaces and blade corrosion under the de-ice boot.

- (a) Apply masking material to the de-ice boot so that approximately 0.25 inch (6.35 mm) of the de-ice boot edge is exposed.
- (b) Apply masking material to the blade approximately 0.5 inch (12.7 mm) outside of the de-ice boot and around the edges of the de-ice boot and restrainer strap, if applicable.

**NOTE:** There will be an unmasked area approximately 0.75 inch (19 mm) wide (0.5 inch [12.7 mm] outside of the de-ice boot and 0.25 inch [6.35 mm] inside the area of the de-ice boot).

- (c) Apply masking material to the blade shank and blade retention radius or propeller hub or blade clamp.
- (d) Apply masking material to the lead strap, if applicable.
- (e) Apply wash primer (Mixture #3) over the area to be sealed and permit the wash primer to dry.
- (f) Apply two layers of paint sealer over the area between the masked surfaces.
- (g) Immediately remove all masking material.
- (h) Permit the painter sealer to dry.

H. Erosion Tape CM158

- (1) If applicable, install erosion tape CM158 in accordance with the section, "Erosion Tape CM158 Removal/Installation" in this chapter.



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**I. Bonding the De-ice Boot Lead Wires to the Blade**

**(1) General**

- (a) This procedure applies to the following Hartzell propellers that require the de-ice boot lead wire to be bonded to the blade shank:
  - 1 HC-(D,E)4(A,N,P)-( ) lightweight turbine propellers with aluminum blades
  - 2 ( )HC-(C,E,H,J)( )Y( )-( ) compact propellers with aluminum blades
- (b) This procedure provides the instructions for the de-ice boot lead wire to be bonded to the blade shank and may be used at installation or as a repair.
  - 1 Use the the applicable steps as necessary for installation or for repair.
- (c) If necessary, remove the spinner dome in accordance with the applicable Hartzell Propeller owner's manual.
- (d) If a damaged, or frayed lead wire is found, rebond all lead wires to the blades on the propeller assembly.
  - 1 If the wire is exposed, replace the boot.
- (e) If applicable masking is performed, the repair may be performed on the aircraft. Propeller removal and disassembly is not required.
- (f) If necessary, make note of the location of the connector plugs and the type and location of the tie straps.
- (g) If necessary, remove the tie straps holding the connector plugs to the counterweight.
- (h) For most installations, removal of the tie straps is not required. The bonding of the de-ice boot lead wires may be performed with the tie straps installed.
- (i) If required, disconnect the plugs of the de-ice boot lead wire connector and the wire harness connector.

(2) Preparation

**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:** DO NOT PULL OR STRETCH THE DE-ICE BOOT LEAD WIRES. PULLING OR STRETCHING MAY CAUSE THE LEAD WIRES TO SEPARATE FROM THE DE-ICE BOOT.

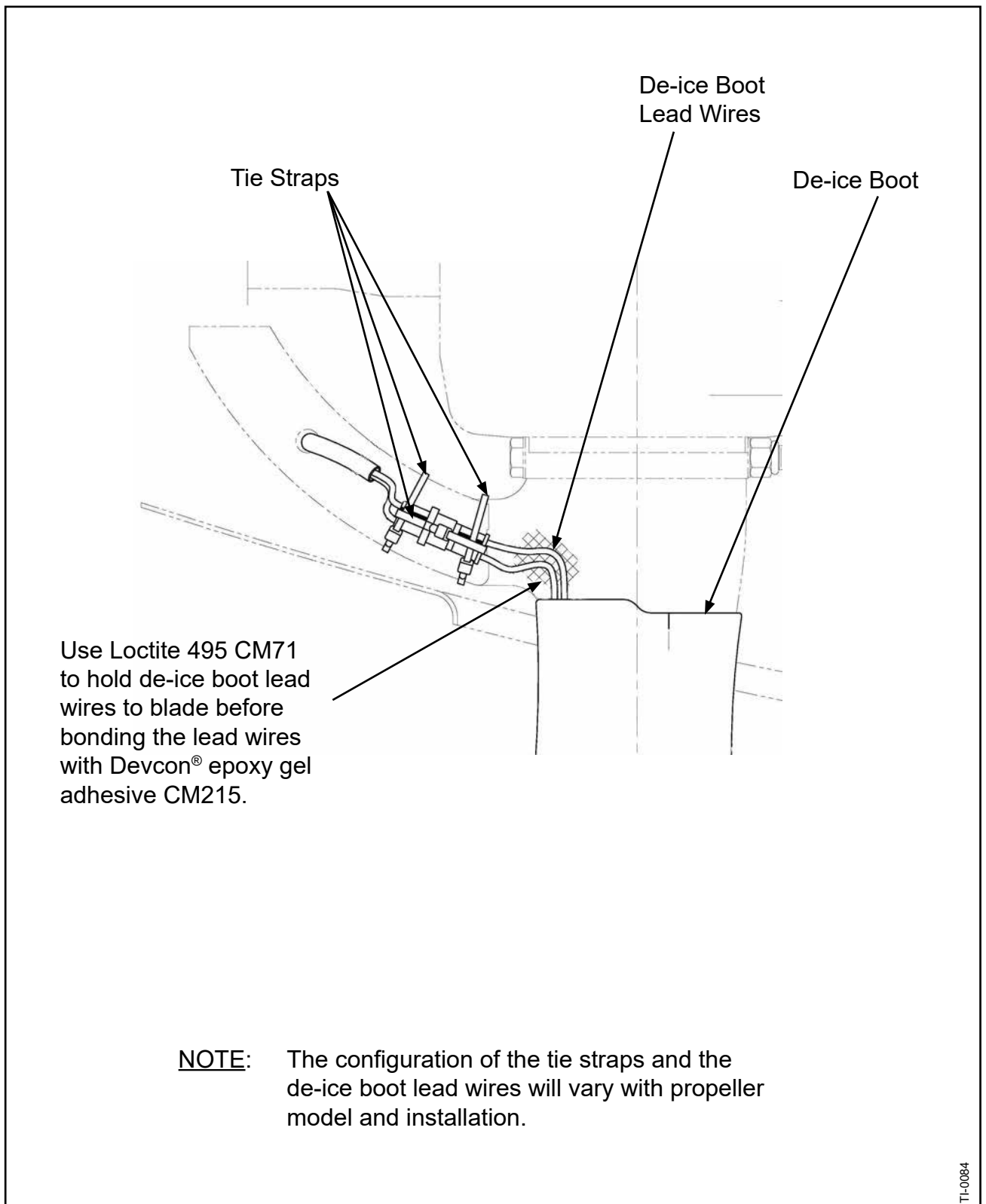
- (a) Move the de-ice boot lead wire away from the area on the blade where the lead wires will be bonded.
- (b) Hartzell Propeller LLC recommends that a de-ice boot resistance check be performed before bonding the lead wires to the blade.

- 1 Using an Ohm meter, measure the electrical resistance of each electric de-ice boot. For resistance values, refer to Table 3-5 in the "Resistance Values" section in this chapter.
    - a If the resistance measurement is within the resistance values specified, proceed to step 3.I.(3).
    - b If the resistance measurement is not within the resistance values specified, replace the de-ice boot in accordance with the procedures in this manual.

(3) Procedure if Using Devcon® 14240 Epoxy Gel Adhesive CM215

- (a) Apply masking material to the hub and the de-ice boot.
  - 1 To prevent solvent from loosening the de-ice boot, apply masking material to the inboard edge of the de-ice boot and around the counterweight knob.
  - 2 To prevent solvent from entering the hub, apply masking material to the blade/hub socket.
- (b) Using solvent acetone CM11, MEK CM106, or MPK CM219 and a nonmetallic scrapper or lint free cloth, remove any existing adhesive.
- (c) Using solvent, acetone CM11, MEK CM106, or MPK CM219, clean the lead wires and the area of the blade where the lead wires will be bonded.
- (d) Permit the surface to dry, or, using a clean, lint-free cloth, wipe the surface dry.

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**Securing Lead Wires with Loctite 495 CM71**  
**Figure 3-8**

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MANUAL 180**

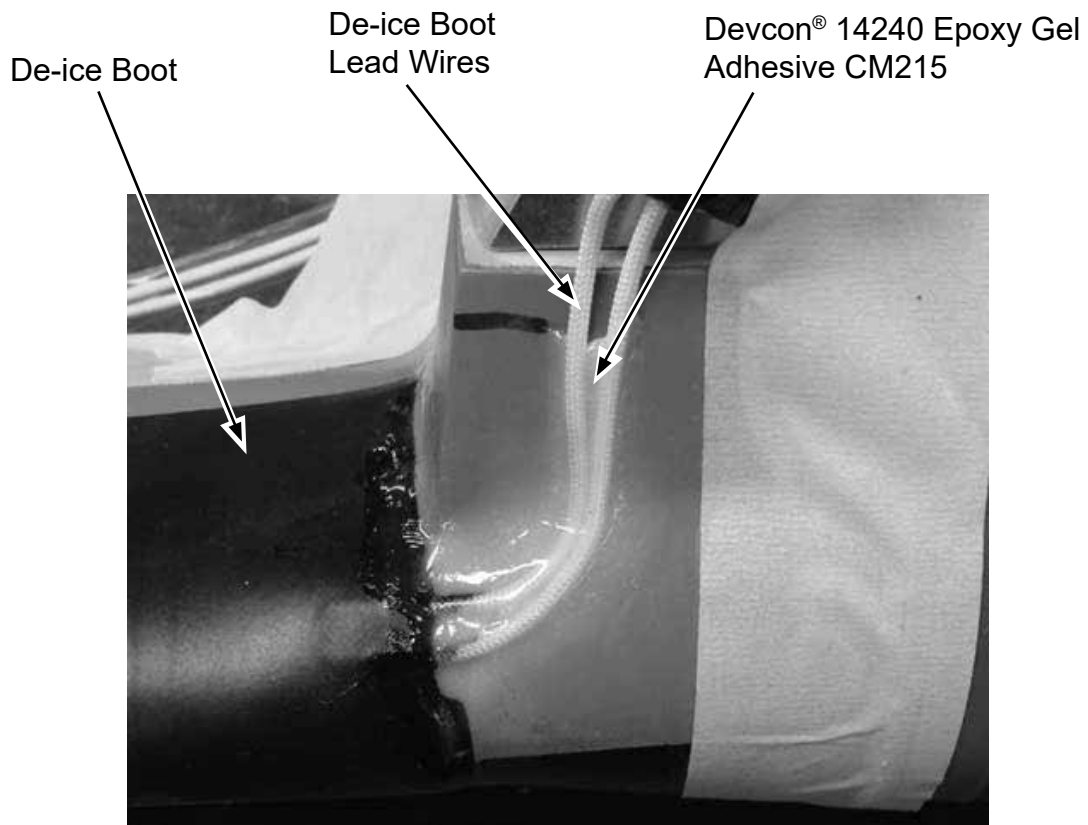
- (e) If required, reconnect the plugs of the de-ice boot lead wire connector and the wire harness connector. Refer to Figure 3-8.
- (f) If required, use the applicable tie straps and secure the connected plugs together. Refer to Figure 3-8.
  - (a) Refer to the Illustrated Parts List chapter in this manual for the applicable tie strap part numbers.
- (g) If required, use the applicable tie strap and secure the connector plugs and lead wires to the counterweight. Refer to Figure 3-8.
  - (a) Refer to the Illustrated Parts List chapter in this manual for the applicable tie strap part numbers.
- (h) Remove the masking material from the blade/hub socket.
- (i) Position the de-ice boot lead wires on the blade. Refer to Figure 3-8.
- (j) Apply Loctite 495 CM71 to tack hold the de-ice boot lead wires to the blade.
- (k) Permit the Loctite 495 CM71 to dry.
- (l) Bonding the de-ice boot lead wires

**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:** FOLLOW ALL THE MANUFACTURER'S PRODUCT INSTRUCTIONS FOR STORAGE, PREPARATION, MIXING, AND APPLICATION.

- 1 Mix the Devcon® 14240 epoxy gel adhesive CM215 in accordance with the manufacturer's instructions.
- 2 Using a tongue depressor, gloved hand, or similar method and the Devcon® 14240 epoxy gel adhesive CM215, bond the de-ice boot lead wires to the blade. Refer to Figure 3-9.
  - a Cover the lead wires and taper the Devcon® 14240 epoxy gel adhesive CM215 to the blade surface.
  - b Stop the the Devcon® 14240 epoxy gel adhesive CM215 approximately 0.25 inch (6.53 mm) from the edge of the counterweight knob surface.

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**NOTE:** The configuration of the de-ice boot lead wires will vary with propeller model and installation.

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**Securing Lead Wires with Devcon® Epoxy Gel Adhesive CM215**  
**Figure 3-9**

Masking for Paint over  
the Devcon® Epoxy Gel  
Adhesive CM215



TI-0086

**Paint Over the Devcon® Epoxy Gel Adhesive CM215**  
**Figure 3-10**

I

- 3 Use a gloved finger, damp sponge or damp, lint free cloth to smooth and blend the surface of the epoxy.
  - 4 Permit the Devcon® 14240 epoxy gel adhesive CM215 to cure in accordance with manufacturer's instructions.
- (m) Apply masking material to the outlined area of the blade as shown in Figure 3-10.
- (n) Using black paint mixture number 5 or black touch-up paint CM145, apply the paint to the epoxy and the blade surface as shown in Figure 3-10.
- (4) Procedure if Using Adhesive 3M 1300L CM10
- 1 The procedure for adhesive 3M 1300L CM10 is a superseded procedure for bonding the de-ice boot lead wires to the blade.
  - 2 Propellers currently in service or in inventory with 3M 1300L CM10 are approved for continued use.
  - 3 At next propeller overhaul or boot replacement, use the Devcon® 14240 epoxy gel adhesive CM215 for bonding the de-ice boot lead wires to the blade.

J. Final Inspection

- (1) After installation of the de-ice boot, permit a minimum drying time of 12 hours before making an inspection.
- (2) Run a thumb over the edges of the boot to make sure that all the de-ice boot edges are bonded.
- (3) Measure the electrical resistance of each electric de-ice boot before returning the propeller to service. For resistance values, refer to Table 3-5 in the section, "Resistance Values".

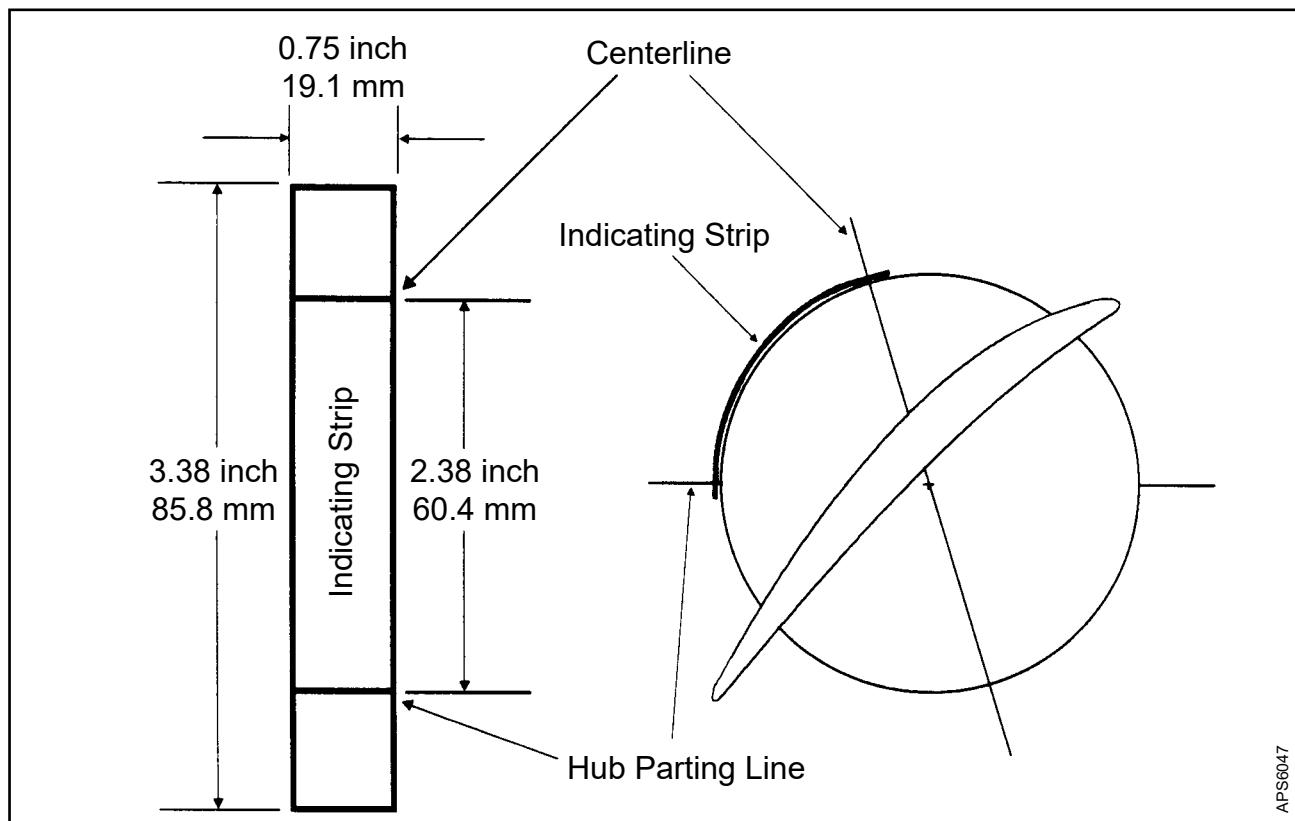
K. Minimum Required Dry/Cure Times

- (1) Before flying aircraft:
  - 12 hours for a short lead strap de-ice boot
  - 24 hours for a long lead de-ice boot
- (2) Before operating de-icing system:
  - 24 hours for all installations
- (3) The filler and paint sealer will not be fully cured at this point. Operation in adverse conditions may damage the filler and paint sealer.

## 7. Installing a De-ice Boot on a Composite Blade

### A. Locate the Blade Centerline

- (1) For Composite Blade Model E13890K Only - When Installed in a Hub:
  - (a) Move the propeller assembly to the full feathered position. Refer to Hartzell Propeller Operation and Line Maintenance Manual 161 (61-10-61), or the Aircraft Maintenance Manual.
  - (b) Locally manufacture a one-piece indicating strip.
    - 1 The strip can be made out of any flexible material.
    - 2 Cut the material to produce a strip measuring 0.75 inch (19.1 mm) x 2.38 inches (60.4 mm) long.
      - a A longer strip may be used if marks are placed 2.38 inches (60.4 mm) apart, across the 0.75 inch (19.1 mm) width. This technique will permit the ends of the strip to be held down without obstructing the view.



**E13890K Blade Centerline Indicating Strip**  
**Figure 3-11**



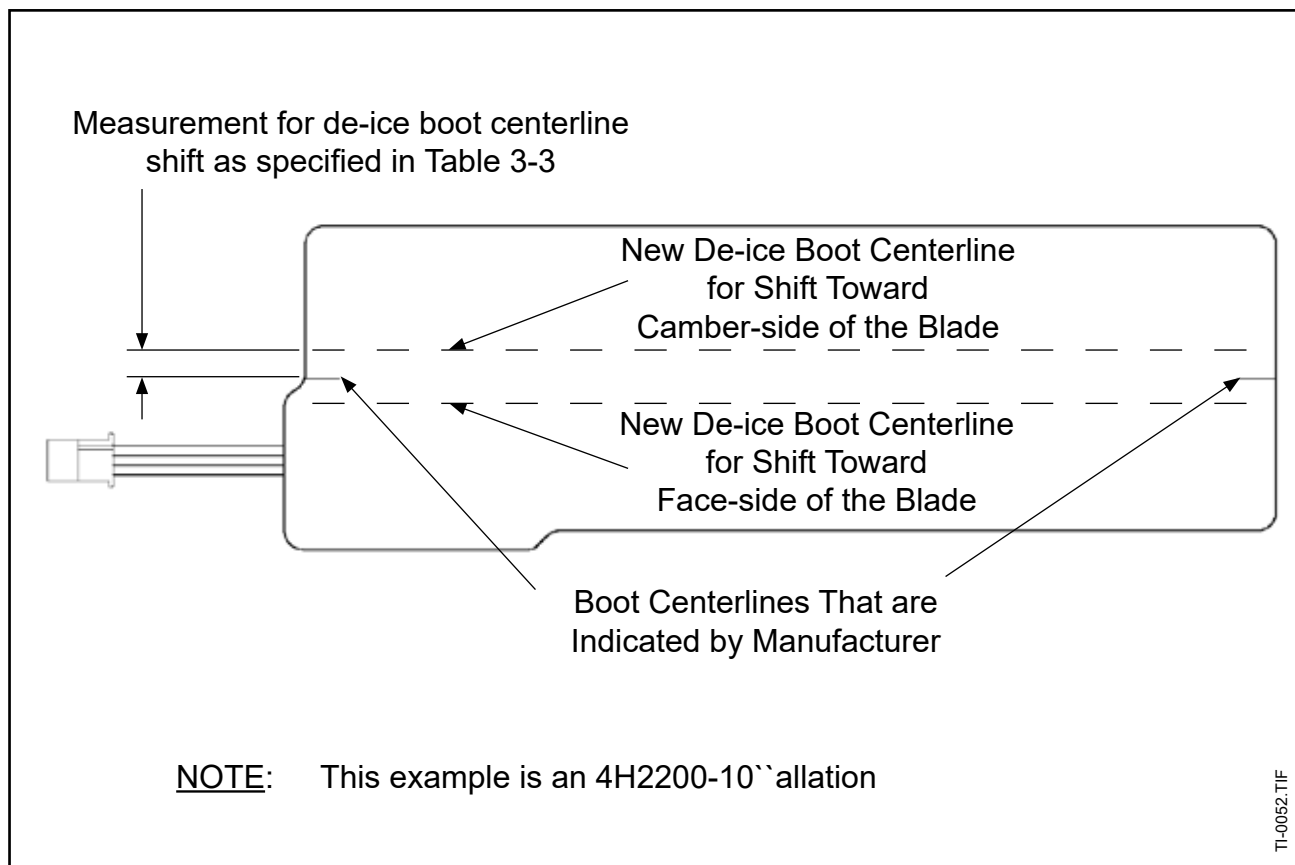
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- (c) Put the indicating strip directly on the largest, machined diameter winding, on the camber side of the blade.
  - 1 While viewing from the tip of the blade, looking towards the hub, adjust the position of the strip so that the left end of the strip (or mark) aligns with the hub parting line.
  - 2 The right end of the strip identifies the location of the blade centerline.
  - 3 Make a mark on the winding to indicate the position of the strip.
  - 4 Make the mark between the blade seal ring and the largest diameter machined section of the winding. Refer to Figure 3-11.
- (2) For Composite Blade Model E13890K Only - When Removed from a Hub:
  - (a) Move the blade on the inspection bench to an angle of 54.7 degrees at the 54 inch radius (49.25 inches [1250.9 mm] from the butt of the blade).
  - (b) The blade centerline will be located at the 12:00 o'clock position on the shank.
- (3) For All Blade Models, Except E13890K - In or Out of a Hub
  - (a) Looking from the tip of the blade, sight along the leading edge, toward the shank.
  - (b) Mark the winding where the curvature of the leading edge intersects the largest machined diameter of the winding.
  - (c) Repeat this procedure, if necessary, after the preparation of the blade because of the sanding and cleaning required.

## B. Marking for Installation

**CAUTION:** EACH DE-ICE BOOT ON A SINGLE PROPELLER ASSEMBLY MUST BE LOCATED THE SAME DISTANCE FROM THE HUB FOR ROTATIONAL BALANCE.

- (1) Put the boot on the blade with the inboard edge of the boot aligned with the "A" or "C" dimension mark.
  - (a) Refer to the section, "Mark the Boot Location on the Blade" in this chapter to determine the correct "A" or "C" dimension.
- (2) For blades that do not have centerline shift information specified in Table 3-3, put the boot on the blade so that the centerline of the boot is aligned with the blade shank and leading edge centerlines.
  - (a) Make marks on the breeze (exposed) side on the inboard and outboard edges of the boot that show the centerline.



**Marking the De-ice Boot for Centerline Shift**  
**Figure 3-12**

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- (b) Using a straight edge, connect the marks at the inboard and outboard edges of the boot on the breeze (exposed) side to show the centerline.

- 1 The marked centerline is the centerline for installation and the marked centerline may not indicate the actual center of the boot.

**NOTE:** Most de-ice boots have a centerline indication marked with silver ink. Some older designs have a scribed line or a raised area at the inboard and outboard edges on the breeze (exposed) side to indicate the centerline of the de-ice boot.

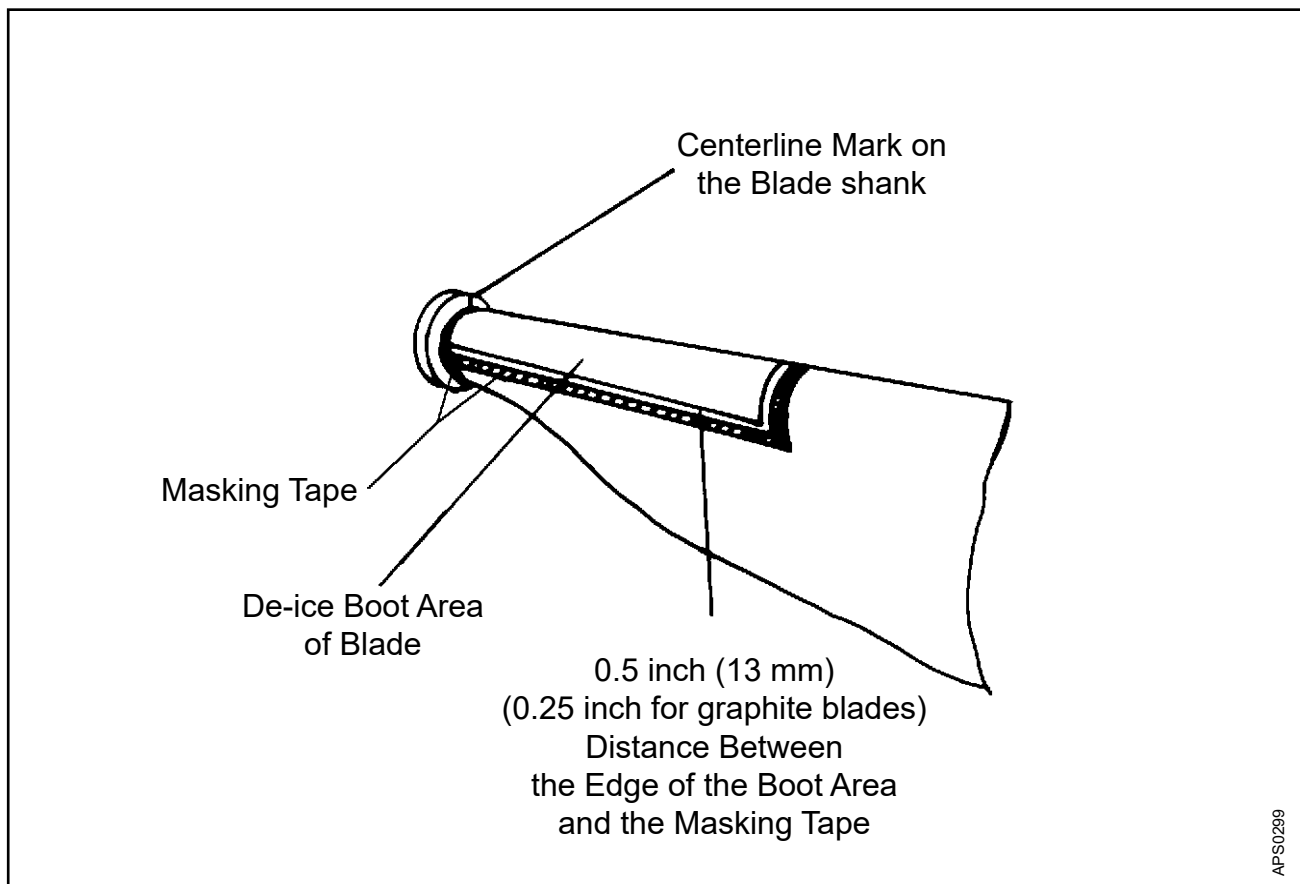
- (3) For blades that have centerline shift information specified in the Table 3-3, mark the de-ice boot to show a new shifted centerline. Refer to Figure 3-12.

- (a) Using the distance and direction specified for the de-ice boot centerline shift in the Table 3-3, measure out from the manufacturer's centerline to identify the new shifted centerline.
- (b) Make marks on the breeze (exposed) side on the inboard and outboard edges of the de-ice boot that show the new shifted centerline that was identified in the previous step.
- (c) Using a straight edge, connect the marks at the inboard and outboard edges of the de-ice boot on the breeze (exposed) side to make a new centerline.
- (d) Put the de-ice boot on the blade so that the new shifted de-ice boot centerline is aligned with the blade shank and leading edge centerlines.

**NOTE:** The new centerline causes the entire de-ice boot to shift toward the face or camber side of the blade, as applicable.

C. Mask the Blade for Sanding

- (1) Fold the boot over the blade and hold it in position.
- (2) Using a non-graphite pencil CM162, or equivalent, mark a line approximately 0.5 inch (12.7 mm) away from the boot around the entire perimeter, except at the shank.
- (3) Remove the de-ice boot and apply masking material to protect the area outside of the marking. Refer to Figure 3-13.
- (4) Apply masking material to the following if applicable.
  - (a) For 7890K, E8190, E10950P(C)(B,K), E11990K and E12902K designs if being Overhauled: Apply masking material to cover and protect the erosion shield.
  - (b) E13890K Design Only: Do not apply masking material to the largest diameter machined winding if a Terminal Mount Strap is to be applied.



**Masking the Blade for De-ice Boot Adhesive Application**  
**Figure 3-13**

**D. Sand the De-ice Boot Location**

**CAUTION:** FOR 7890K, E8190, E10950P(C)(B,K), E11990K AND E12902K DESIGNS: DO NOT SAND THE NICKEL EROSION SHIELD IF IT IS BEING OVERHAULED. WASH PRIMER WAS APPLIED TO THE EROSION SHIELD DURING THE FINISH PROCEDURE AND MUST NOT BE DISTURBED BY SANDING.

- (1) For better de-ice boot adhesion, hand sand the area inside the masking tape with 120 to 160 grit sandpaper until the polane painted surface is totally scuffed.
- (2) For Blade Model E13890K: If a terminal mount strap is to be installed, sand the largest diameter machined winding.

**E. For Blade Models 7890K, E8190, E10950P(C)(B,K), E11990K and E12902K - If Not Being Overhauled**

- (1) Make sure that all paint and primer is completely removed from the erosion shield in the area that will be covered by the de-ice boot.

**CAUTION:** MAKE SURE THAT THE ENTIRE AREA THAT WILL BE COVERED BY THE DE-ICE BOOT IS THOROUGHLY SCUFFED.

- (2) Using 120 to 160 grit sandpaper and sanding in the lengthwise direction (butt of blade to the tip, sand the surface of the erosion shield that will be covered by the de-ice boot.
- (3) Using a clean cloth dampened with denatured alcohol, clean the erosion shield area that will be covered by the de-ice boot.
- (4) Permit the alcohol to evaporate.
- (5) Apply Wash Primer (Mix #3) to the erosion shield area that will be covered by the de-ice boot. Refer to the Finish Procedures chapter of this manual.

**CAUTION:** THE WASH PRIMER MUST DRY FOR A MINIMUM OF 30 MINUTES. THE WASH PRIMER "ETCHES" THE NICKEL EROSION SHIELD AND IMPROVES ADHESIVE ADHESION.

- (6) Permit the wash primer to dry for a minimum of 30 minutes.

**CAUTION:** USE ONLY DENATURED ALCOHOL FOR THE FOLLOWING CLEANING OPERATION AND WHEN CLEANING ANY AREA THAT HAS CONDUCTIVE COATING EXPOSED.

- (7) Using a clean cloth dampened with denatured alcohol, wipe the wash primer from the blade.

F. Final Cleaning of the Blade

CAUTION 1: E10950P(C)(B,K), E11990K AND E12902K DESIGN: USE ONLY DENATURED ALCOHOL FOR THE FOLLOWING CLEANING OPERATION. DENATURED ALCOHOL REMOVES THE "RUBBER" COMPONENT OF THE WASHER PRIMER THAT MUST BE REMOVED AFTER THE ETCHING PROCESS. OTHER SOLVENTS MAY ADVERSELY AFFECT THE ADHESION TO THE EXPOSED NICKEL EROSION SHIELD.

CAUTION 2: CLEANLINESS IS ESSENTIAL FOR PROPER DE-ICE BOOT ADHESION. ALL SOLVENTS MUST BE FREE OF CONTAMINANTS. BRUSHES AND CLOTHS MUST BE CLEAN AND LINT FREE. DO NOT TOUCH THE SURFACES AFTER THEY HAVE BEEN PREPARED.

- (1) Remove all masking material from the blade that was used as the sanding guide.
- (2) Using a clean cloth dampened with denatured alcohol, clean the entire de-ice boot location on the blade with denatured alcohol only.
- (3) For Blade Model E13890K Only: If a new terminal mount strap is being installed, clean the largest diameter of the machined winding.

G. Apply Masking Material for Adhesive Application

- (1) Examine the blade to make sure that the blade centerline is clearly defined at the inboard end of the de-ice boot location. Refer to the section, "Locate the Blade Centerline" in this chapter for details.
- (2) Apply masking material to the surface of the blade, leaving 0.50 inch (13 mm) of the non-sanded surface exposed around the sanded area. Refer to Figure 3-13.
  - (a) For Blade Model E13890K Only: The amount of exposed non-sanded surface may be reduced to 0.25 inch (6.4 mm).

H. Clean the De-ice Boot

CAUTION: CLEANLINESS IS ESSENTIAL FOR PROPER DE-ICE BOOT ADHESION. ALL SOLVENTS MUST BE FREE OF CONTAMINANTS. BRUSHES AND CLOTHS MUST BE CLEAN AND LINT FREE. DO NOT TOUCH THE SURFACES AFTER THEY HAVE BEEN PREPARED.

NOTE: E13890K Design: The following procedure must be used for the preparation of the blade before the installation of the B-6443 Terminal Mount Strap. The strap locates around the outside diameter of the largest machined winding. Installation of the terminal mount strap is mandatory when a B-6442 de-ice boot is being used on the blade.

- (1) Moisten a clean cloth with solvent MEK CM106, MPK CM219, or toluene CM41 and clean the bond-side of the de-ice boot.
- (2) Permit the solvent to evaporate.
- (3) E13890K Design: Using a clean cloth dampened with solvent MEK CM106, MPK CM219, or toluene CM41, clean the bond-side of the de-ice boot and Terminal Mount Strap.

## I. Adhesive Application

**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:** THE BLADE AND DE-ICE BOOT CONTACTING SURFACES TO BE BONDED MUST BE THOROUGHLY AND COMPLETELY COVERED WITH ADHESIVE. TWO LAYERS OF ADHESIVE ARE REQUIRED. DO NOT APPLY ADHESIVE OR INSTALL THE DE-ICE BOOT IF THE RELATIVE HUMIDITY IS ABOVE 90 PERCENT OR IF THE TEMPERATURE IS BELOW 50° F (10° C). FOR BEST RESULTS, APPLY ADHESIVE AND PERFORM DE-ICE BOOT INSTALLATION AT TEMPERATURES BETWEEN 65-75°F (19-23°C), WITH RELATIVE HUMIDITY EQUAL TO OR LESS THAN 90 PERCENT. CURING TIMES VARY WITH TEMPERATURE AND RELATIVE HUMIDITY. IF RELATIVE HUMIDITY IS BETWEEN 75-90 PERCENT, PERMIT ADDITIONAL CURING TIME. WHEN ADHESIVE IS APPLIED AT TEMPERATURES BELOW 65°F (19° C), THE BOND STRENGTH IS DIMINISHED REGARDLESS OF THE LENGTH OF CURING TIME.

- (1) Verify that the correct boot is being installed. Refer to Hartzell Propeller Application Guide Manual 159 (61-02-59).
  - (a) Refer to Hartzell Propeller Service Letters HC-SL-30-260 and HC-SL-30-279 for additional approved de-ice boots manufactured by Hartzell Propeller LLC.
- (2) Measure the electrical resistance of the de-ice boot.
  - (a) Using an Ohm meter, measure the resistance of the de-ice boot.
  - (b) Compare the resistance measurement to the resistance values listed in Table 3-5 of the "Resistance Values" section in this chapter.
  - (c) If the resistance measurement is not within the resistance values specified, replace the de-ice boot.
- (3) For best results, apply adhesive at room temperature (65 - 75° F [18-24°C]). Drying time will vary with temperature and relative humidity.



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- (4) A de-ice boot or terminal mount strap may be installed on a blade while it is installed in the hub.
  - (a) The propeller blade being serviced must be positioned in a manner to prevent the contamination of other propeller components.
  - (b) Dynamic balance of the propeller assembly is recommended after a de-ice boot is replaced on a blade while in the hub.
- (5) There are three different adhesive options available for de-ice boot and/or terminal mount strap installation.
  - (a) For Blade Model E13890K: If a Terminal Mount Strap is to be installed, apply adhesive to the largest machined diameter winding and the terminal mount strap, using one of the following adhesive application options.
  - (b) Adhesive Application, Option A
    - 1 Mix adhesive CM10 thoroughly and brush one even layer on the de-ice boot and 1.5 inches (38.1 mm) on the lead wire strap (where applicable). Brush one even layer on the area of the blade to be booted. Permit the adhesive to dry a minimum of one hour.
    - 2 Apply a second even layer of adhesive CM10 to the de-ice boot and blade. Permit the surfaces to dry until the adhesive is slightly sticky to the touch.
  - (c) Adhesive Application, Option B
    - 1 Stir primer CM57 thoroughly and apply one even layer to the masked area of the blade.
    - 2 Permit the primer CM57 to air dry for a minimum of one hour before applying adhesive.

**CAUTION:** THOROUGHLY STIR ADHESIVE CURING AGENT BEFORE MIXING IT WITH THE ADHESIVE BECAUSE THE INGREDIENTS OF THE CURING AGENT MAY HAVE SEPARATED.

- 3 Mixing Instructions for CM114-1
  - a Mix 9 parts adhesive CM79 with 1 part adhesive curing agent CM114-1 by volume. Thoroughly mix until a consistent color tone is present.
- 4 Mixing Instructions for CM114-2
  - a Mix 2 parts curing agent CM114-2 to 100 parts adhesive CM79 by weight. Thoroughly mix until a consistent color tone is present.

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- 5 Apply one even layer of the adhesive mixture to the boot and the primed area of the blade.
- 6 Permit the adhesive mixture to air dry for a minimum of one hour.
- 7 Apply a second layer layer of the adhesive mixture to the boot and blade.
- 8 Permit the bonded surface to dry until the adhesive is slightly sticky to the touch.

(d) Adhesive Application, Option C

- 1 Stir primer CM216 thoroughly and apply one even layer to the masked area of the blade.
- 2 Permit the primer CM216 to air dry for a minimum of one hour before applying adhesive.

**CAUTION:** THOROUGHLY SHAKE THE CONTAINER OF ADHESIVE CURING AGENT CM218 BEFORE MIXING IT WITH THE ADHESIVE BECAUSE THE INGREDIENTS OF THE CURING AGENT MAY HAVE SEPARATED.

- 3 Mix adhesive CM217 with the adhesive curing agent CM218 in accordance with the manufacturer's technical data sheet. Thoroughly mix until a consistent color tone is present..
- 4 Apply one even layer of the adhesive mixture to the boot, lead strap if applicable, and the primed area of the blade.
- 5 Permit the adhesive mixture to air dry for a minimum of one hour.
- 6 Apply a second layer layer of the adhesive mixture to the boot, 1.5 inches (38.1 mm) of the lead strap if applicable, and the area of the blade to be booted.
- 7 Permit the surfaces to dry until the adhesive is slightly sticky to the touch (as if touching the glue-side of masking tape).
- 8 Tack life is 10 to 20 minutes.

J. De-ice Boot Installation

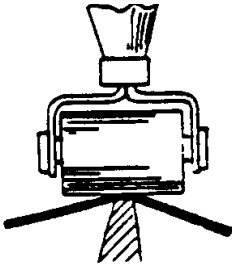
**CAUTION:** THE BONDING SURFACES MUST BE THOROUGHLY COVERED WITH ADHESIVE. TWO LAYERS OF ADHESIVE ARE REQUIRED.

- (1) The E10950P(C)( ) blade design was originally manufactured with a high watt density de-ice boot.

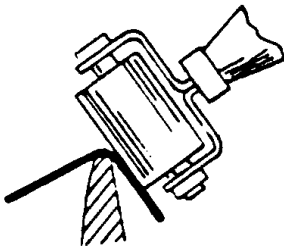
**CAUTION:** BECAUSE OF ADDITIONAL CHANGES TO THE AIRFRAME COMPONENTS OF THE PROPELLER DE-ICE SYSTEM, PROPELLERS WITH LOW WATT DENSITY DE-ICE BOOTS ARE NOT INTERCHANGEABLE ON THE AIRCRAFT WITH PROPELLERS WITH HIGH WATT DENSITY DE-ICE BOOTS.

- (a) Low watt density de-ice boots are available for the E10950P(C)( ) design.
- (b) Installation of the low watt density de-ice boot changes the propeller blade model from E10950P(C)K to E10950P(C)B.
  - 1 The model number change must be made on the ink stamping or label on the camber side of the blade.
  - 2 Peen out the "K" designation from the butt of the blade.
  - 3 Change the ink stamping or label on the camber side of the blade to reflect the de-ice boot installed on the blade.
- (2) For best results, install the de-ice boot at room temperature (65-75° F [18-24°C]).
  - (a) Drying time will vary with temperature and relative humidity.
- (3) Make sure that the pencil mark at the "A" or "C" dimension is in line with the leading edge of the blade. Refer to the section, "Marking for Installation" in this chapter for details.
  - (a) If the blade is installed in the hub, use the dimension noted before the removal of the previous de-ice boot to locate the inboard end of the new de-ice boot.
- (4) Starting at the shank end, put the inboard end of the de-ice boot at the "A" or "C" dimension mark while aligning the indicated centerline of the de-ice boot with the blade centerline, marked on the winding.
- (5) Working outward, slowly lower the outboard end of the de-ice boot to the blade while tacking the centerline of the de-ice boot onto the crest of the leading edge of the blade.
  - (a) If the de-ice boot becomes misaligned, pull up with a quick motion and reapply the de-ice boot.
  - (b) If the adhesive is removed from either surface, reapply the adhesive and permit to dry until tacky before continuing application of the de-ice boot.

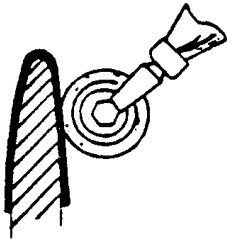
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Step 1 Roll firmly along the centerline with a wood or rubber roller.



Step 2 Gradually tilt the roller and carefully work the de-ice boot over each side of the blade contour.



Step 3 Roll outward from the centerline to the edges.



Step 4 If excess material at the edges puckers, work out smoothly and carefully with fingers.

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Rolling the De-ice Boot onto Blade  
Figure 3-14

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- (c) When using Adhesive Application, Option A or Option B: if the adhesive becomes too dry, reactivate with a clean, lint free cloth dampened with solvent MEK CM106, MPK CM219, toluene CM41, or acetone CM11.

**CAUTION:** DO NOT REACTIVATE THE ADHESIVE WHEN USING ADHESIVE APPLICATION, OPTION C.

- (d) When using Adhesive Application, Option C: toward the end of the tack life, the adhesive may appear to be dry, but is still active and does not require reactivation.
- (6) When the centerline is correctly positioned, roll firmly along the centerline with a rubber roller TE330 or TE331. Refer to Figure 3-14.
  - (7) Gradually tilt the roller and carefully work the de-ice boot over one side of blade contour using care to avoid trapping air under the de-ice boot.
    - (a) Start inboard on the de-ice boot and work outboard.
    - (b) After one side is initially rolled into place apply the other side in the same way.

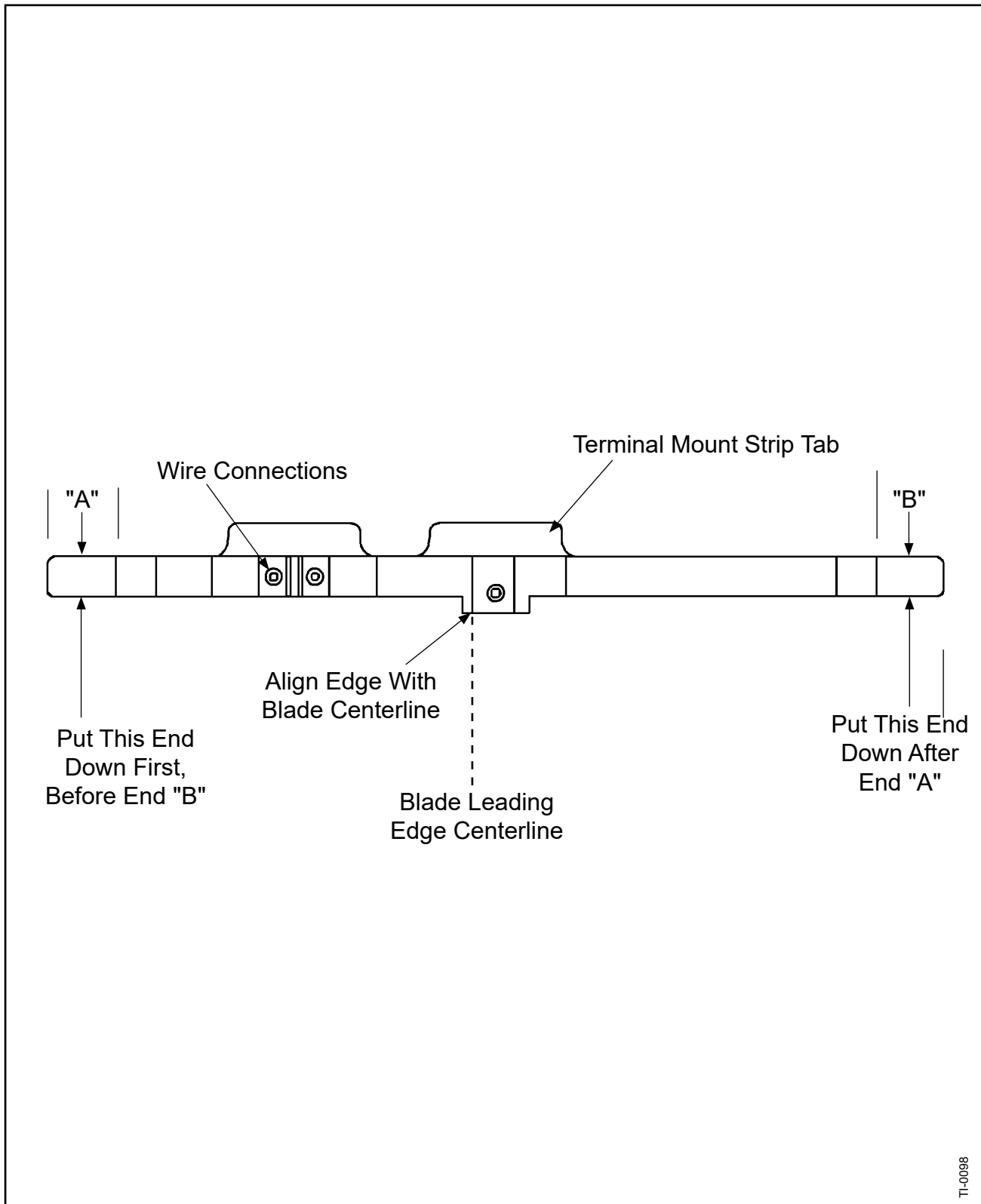
**NOTE:** Short repetitive strokes in a diagonal direction from an inboard position towards the outboard trailing edge, with small advancements toward the tip of the blade with every stroke is an effective way to eliminate the trapping of air and the puckering of the de-ice boot material.

- (8) Work out excess material at the outboard edge of the de-ice boot before the edge is completely rolled down.
  - (a) If excess material at the edges tends to pucker, work out puckers smoothly and carefully with fingers.
  - (b) Puckers are not permitted.

**CAUTION:** DO NOT PERMIT THE GOOSENECK OR SMOOTH STEEL ROLLER TO TOUCH ANY PORTION OF THE HEATING ELEMENT BECAUSE DAMAGE MAY RESULT. USE ONLY A RUBBER OR SILICON ROLLER IN AN AREA WHERE THERE IS A HEATING ELEMENT.

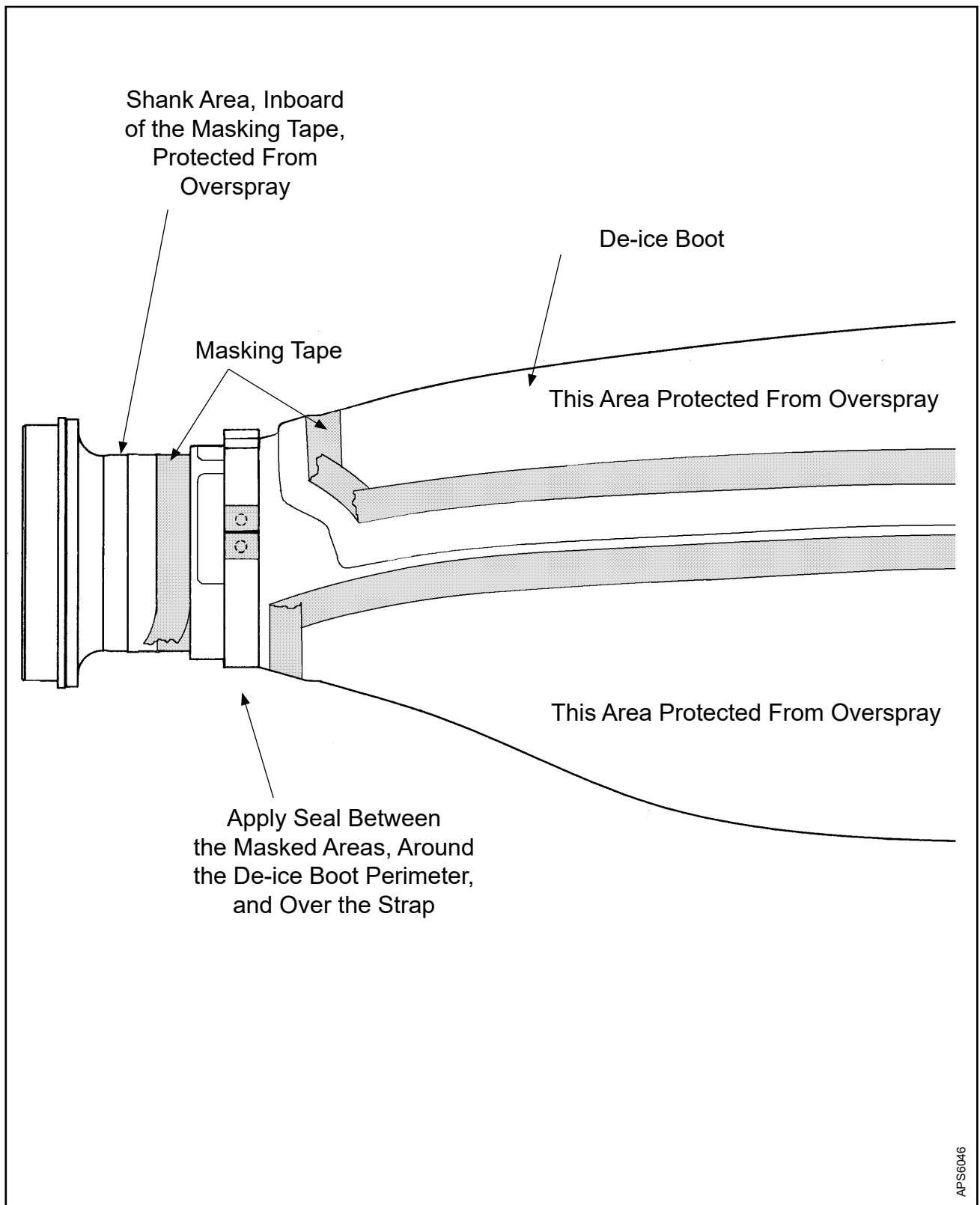
- (9) Use the edge of a roller to firmly roll down the tapered edges of the de-ice boot.
  - (a) A roller may be used only within 0.1875 inch (4.763 mm) from any edge.
- (10) Remove masking tape and permit the de-ice boot installation to dry (cure) a minimum of eight hours.

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Terminal Mount Strap  
Figure 3-15

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De-ice Seal Location  
Figure 3-16

K. Terminal Mount Strap Installation - E13890K Blades Only

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.

CAUTION: THE CONTACTING SURFACES TO BE BONDED MUST BE THOROUGHLY AND COMPLETELY COVERED WITH ADHESIVE. TWO LAYERS OF ADHESIVE ARE REQUIRED. DO NOT APPLY ADHESIVE OR INSTALL THE TERMINAL MOUNT STRAP IF THE RELATIVE HUMIDITY IS ABOVE 90% OR IF THE TEMPERATURE IS BELOW 50° F (10° C). FOR BEST RESULTS, APPLY ADHESIVE AND PERFORM INSTALLATION AT TEMPERATURES BETWEEN 65-75°F (19-23°C), WITH RELATIVE HUMIDITY EQUAL TO OR LESS THAN 90%. CURING TIMES VARY WITH TEMPERATURE AND RELATIVE HUMIDITY. IF RELATIVE HUMIDITY IS BETWEEN 75-90%, PERMIT ADDITIONAL CURING TIME. WHEN ADHESIVE IS APPLIED AT TEMPERATURES BELOW 65°F (19° C), THE BOND STRENGTH IS DIMINISHED REGARDLESS OF THE LENGTH OF CURING TIME.

(1) Position the Terminal Mount Strap - Refer to Figure 3-15 and Figure 3-16

- 1 With the tabs on the terminal mount strap toward the hub assembly, align the wire harness clamp support standoff with the leading edge centerline of the blade. Refer to Figure 3-16.
  - a Center the terminal mount strap on the largest diameter machined winding.
  - b Put end "A" down first over the blade windings, then put end "B" down to overlap onto end "A".
- 2 If the terminal mount strap becomes misaligned, pull-up with a quick motion and reapply to the blade windings.
  - a If the adhesive is removed from either surface, reapply the adhesive and permit to dry until the adhesive is slightly sticky to the touch before continuing the application of the de-ice boot.
  - b When using Adhesive Application, Option A or Option B: if the adhesive becomes too dry, it may be reactivated by lightly applying solvent MEK CM106, MPK CM219, toluene CM41, or acetone CM11 to the adhesive.



**CAUTION:** DO NOT REACTIVATE THE ADHESIVE WHEN USING ADHESIVE APPLICATION, OPTION C.

- c When using Adhesive Application, Option C: Toward the end of the tack life, the adhesive may appear to be dry, but is still active and does not require reactivation.
- (b) Firmly roll the terminal mount strap with roller TE328, or equivalent, and the terminal mount strap tabs with roller TE329, or equivalent, onto blade windings, using care to avoid trapping air under the terminal mount strap, or damaging the threaded electrical connections.
  - 1 Move along the side edges to work down the terminal mount strap and the tabs onto blade.
- (c) Work out any air pockets, material puckers or waves in the terminal mount strap material.
- (d) Immediately after terminal mount strap installation, install MS3367-6-9 tie straps over the terminal mount strap.
  - 1 Make sure that the tie strap “buckle” is not over the wire connectors or the clamp support.
  - 2 As the strap is drawn tight install small pieces of foam rubber, or equivalent spacers, to remove any spaces around wire connection and clamp support pads, where tie strap does not contact the terminal mount strap.
  - 3 Install a MS3367-6-9 tie strap over the tabs of the terminal mount strap.
  - 4 Push outboard as the tie strap is drawn tight to seat the tabs in the inside corner of the winding.
  - 5 Using tie gun TE332, or equivalent, secure each tie strap in position.
- (e) Permit the terminal mount strap installation to dry (cure) a minimum of 8 hours before applying the filler and paint sealer.

## L. Restrainer Strap Installation

### (1) General

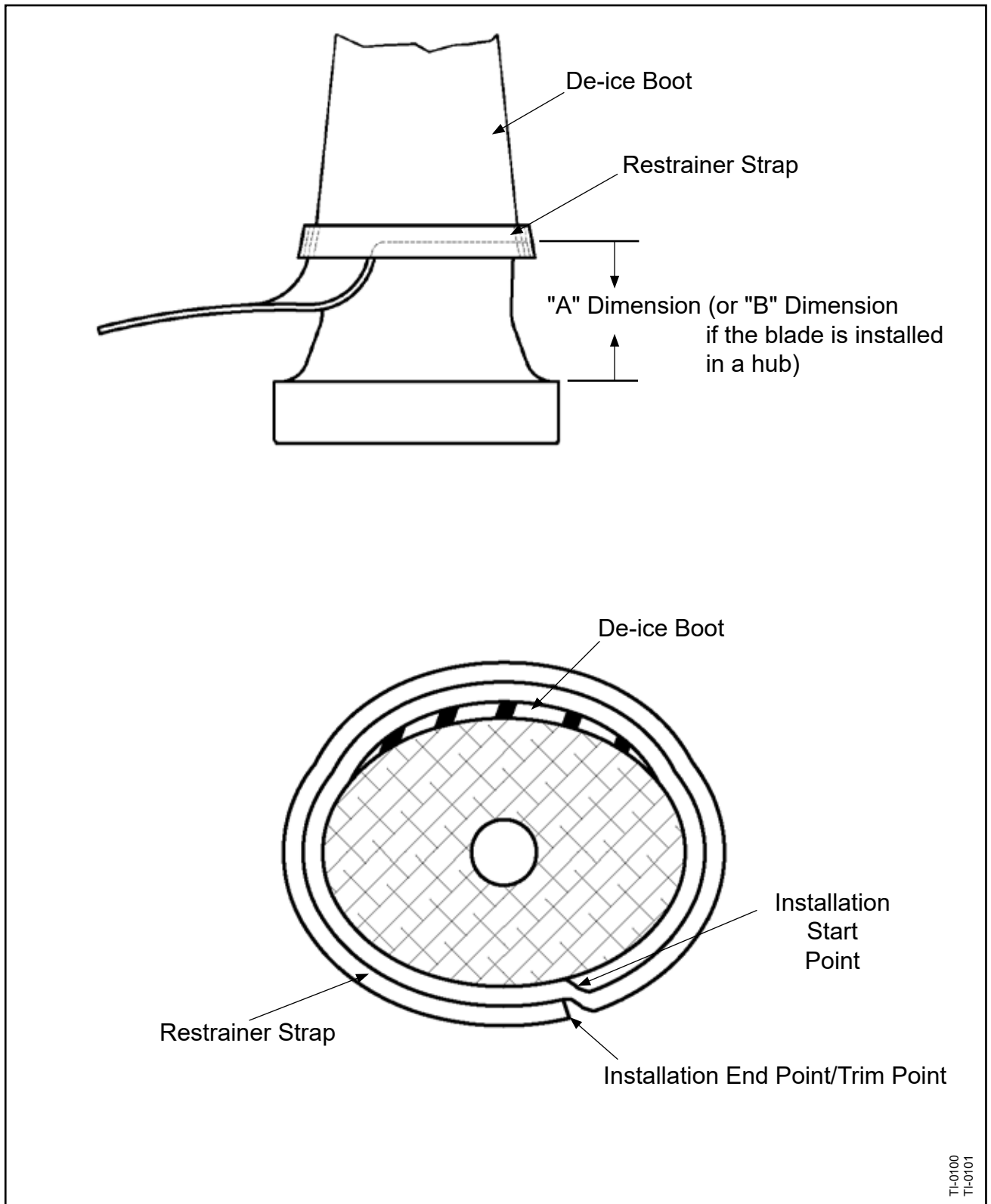
- (a) To determine if a restrainer strap is required for the application. Refer to Table 3-3.

**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.

**CAUTION:** THE BLADE AND DE-ICE BOOT SURFACES TO BE BONDED, MUST BE CONSISTENTLY AND EVENLY BONDED. FOR BEST RESULTS APPLY ADHESIVE AND PERFORM DE-ICE BOOT INSTALLATION AT TEMPERATURES BETWEEN 65-75°F (18-24°C), WITH RELATIVE HUMIDITY LESS THAN 75 PERCENT. IF RELATIVE HUMIDITY IS BETWEEN 75-90 PERCENT, PERMIT ADDITIONAL DRYING TIME. IF ADHESIVE IS APPLIED AT TEMPERATURES BELOW 65°F (18° C), THE BOND STRENGTH IS DIMINISHED REGARDLESS OF THE LENGTH OF DRYING TIME. IF RELATIVE HUMIDITY IS HIGHER THAN 90 PERCENT OR THE TEMPERATURE IS BELOW 50°F (10° C), INSTALLATION IS NOT RECOMMENDED.

- (b) For best results, apply adhesive at room temperature (65 - 75° F [18-24°C]). Drying time will vary with temperature and relative humidity.
- (c) A restrainer strap may be installed on a blade while it is installed in the hub.
- 1 The propeller blade being serviced must be positioned in a manner to prevent the contamination of other propeller components.

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**Restrainer Strap Installation**  
**Figure 3-17**

(2) Installation Procedure

- (a) Determine where the restrainer strap will be located. Refer to Figure 3-17 and Table 3-3.
- (b) Using a clean cloth dampened with solvent toluene CM41, MEK CM106, MPK CM219, isopropyl alcohol CM183, acetone CM11, or equivalent, thoroughly clean both sides of the restrainer strap and an approximately 1.5 inch (38 mm) area of the blade where the restrainer strap will be located.
  - 1 The approximately 1.5 inch (38 mm) area of the blade where the restrainer strap will be located includes the blade shank, the de-ice boot, and the lead strap, if applicable.
- (c) There are three different adhesive options available for de-ice boot and/or restrainer strap installation.
  - 1 Adhesive Application, Option A
    - a Mix adhesive CM10 thoroughly.
    - b Apply one even layer of the adhesive CM10 on the approximately 1.5 inch (38 mm) area of the blade where the restrainer strap will be located, including the de-ice boot and the lead strap, if applicable.
    - c Apply one even layer of the adhesive CM10 on the surface of the restraining strap to be bonded.
    - d Permit the adhesive CM10 to dry a minimum of one hour.
    - e Apply a second even layer of adhesive CM10 to the approximately 1.5 inch (38 mm) area of the blade where the restrainer strap will be located, including the de-ice boot and the lead strap, if applicable.
    - f Apply a second even layer of adhesive CM10 to the surface of the restraining strap to be bonded.
    - g Permit the surfaces to dry until the adhesive is slightly sticky to the touch.

2 Adhesive Application, Option B

- a Stir primer CM57 thoroughly and apply one even layer to the masked area of the blade.
- b Permit the primer CM57 to air dry for a minimum of one hour before applying adhesive.

CAUTION: THOROUGHLY STIR ADHESIVE CURING AGENT BEFORE MIXING IT WITH THE ADHESIVE BECAUSE THE INGREDIENTS OF THE CURING AGENT MAY HAVE SEPARATED.

c Mixing Instructions for CM114-1

- 1) Mix 9 parts adhesive CM79 with 1 part adhesive curing agent CM114-1 by volume. Thoroughly mix until a consistent color tone is present.

d Mixing Instructions for CM114-2

- 1) Mix 2 parts curing agent CM114-2 to 100 parts adhesive CM79 by weight. Thoroughly mix until a consistent color tone is present.

- e Apply one even layer of the adhesive mixture to the approximately 1.5 inch (38 mm) area of the blade where the restrainer strap will be located, including the de-ice boot and the lead strap, if applicable.
- f Apply one even layer of the adhesive mixture to the surface of the restraining strap to be bonded.
- g Permit the adhesive mixture to air dry for a minimum of one hour.
- h Apply a second even layer of the adhesive mixture to the approximately 1.5 inch (38 mm) area of the blade where the restrainer strap will be located, including the de-ice boot and the lead strap, if applicable.
- i Apply a second even layer of the adhesive mixture to the surface of the restraining strap to be bonded.
- j Permit the surfaces to dry until the adhesive is slightly sticky to the touch.

3 Adhesive Application, Option C

- a Stir primer CM216 thoroughly and apply one even layer to the masked area of the blade.
- b Permit the primer CM216 to air dry for a minimum of one hour before applying adhesive.

CAUTION: THOROUGHLY SHAKE THE CONTAINER OF ADHESIVE CURING AGENT CM218 BEFORE MIXING IT WITH THE ADHESIVE BECAUSE THE INGREDIENTS OF THE CURING AGENT MAY HAVE SEPARATED.

- c Mix adhesive CM217 with the adhesive curing agent CM218 in accordance with the manufacturer's technical data sheet. Thoroughly mix until a consistent color tone is present.
- d Apply one even layer of the adhesive mixture to the boot, lead strap if applicable, and the primed area of the blade.
- e Permit the adhesive mixture to air dry for a minimum of one hour.
- f Apply a second layer of the adhesive mixture to the boot, 1.5 inches (38.1 mm) of the lead strap if applicable, and the area of the blade to be booted.
- g Permit the surfaces to dry until the adhesive is slightly sticky to the touch (as if touching the glue-side of masking tape).
- h Tack life is 10 to 20 minutes.

4 Install the restrainer strap.

- a With the restrainer strap centered at the "A" dimension or "B" dimension if the blade is installed in a hub, begin the installation approximately 180 degrees from the de-ice boot lead strap.
- b Wrap the restrainer strap around and make a double thickness and trim, as indicated in Figure 3-17.
- c If the restrainer strap becomes misaligned, pull-up with a quick motion and reapply.
- d If the adhesive is removed from either surface, reapply the adhesive and permit to dry until the adhesive is slightly sticky to the touch before continuing the application of the restrainer strap.
- e When using Adhesive Application, Option A or Option B: if the adhesive becomes too dry, it may be reactivated by lightly applying solvent MEKCM106, MPK CM219, toluene CM41, or acetone CM11 to the adhesive.

**CAUTION:** DO NOT REACTIVATE THE ADHESIVE WHEN USING ADHESIVE APPLICATION, OPTION C.

- f When using Adhesive Application, Option C: toward the end of the tack life, the adhesive may appear to be dry, but is still active and does not require reactivation.
- 5 Using roller TE328, or equivalent, firmly roll the restrainer strap, using care to avoid trapping air under the restrainer strap or damaging the threaded electrical connections.
  - a Move along the side edges to work down the restrainer strap and the tabs onto blade.
  - b Work out any air pockets, material puckers or waves in the restrainer strap material.
- 6 Permit the restrainer strap installation to dry (cure) a minimum of 8 hours before applying filler and paint sealer.
- 7 Apply filler in accordance with the section "Filler Application" in this chapter.

#### M. Inspection

**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.

**CAUTION:** MAKE SURE THAT THE DE-ICE BOOT AND TERMINAL MOUNT STRAP (IF APPLICABLE) APPLICATION HAS CURED A MINIMUM OF 8 HOURS BEFORE INSPECTING.

- (1) Make sure that the de-ice boot, restrainer strap, and terminal mount strap, if applicable, are in the proper positions. Refer to Figure 3-3 and Table 3-3.
  - (a) Examine the de-ice boot, restrainer strap, and terminal mount strap, if applicable, for proper distance from the shank of the blade.
  - (b) If the blade is installed in a hub, make sure that all de-ice boots, restrainer straps, and terminal mount straps, if applicable, are located at the same radial distance from the hub.
- (2) After all installations have cured a minimum of 8 hours, at 50° F (10° C) or above visually inspect the entire edge of the de-ice boot, restrainer strap, and terminal mount strap, if applicable, to make sure that they have correctly bonded to the blade.

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- (3) Make an inspection of the bond of the edges of the de-ice boot, restrainer strap, and terminal mount strap, if applicable.
  - (a) Using a thumb with moderate pressure and a twisting motion, verify the bond.
  - (b) If there is a loose area, bond as necessary using the same adhesive as initially used for the installation and permit to cure before reinspecting.
  - (c) Using an appropriate roller, roll the area where the adhesive was reapplied and permit to cure before making another inspection.
  - (d) Make another inspection of the bond of the edges of the de-ice boot and restrainer strap, if applicable.
  - (e) If there is a loose area, repeat steps 7.N.(3)(a) through 7.N.(3)(d).
  - (f) When the bond of the edges of the de-ice boot, restrainer strap, and terminal mount strap, if applicable, is satisfactory, continue to the next step.
  - (g) Measure the resistance of the de-ice boot lead wires using a standard ohmmeter.
    - 1 Refer to Table 3-5 in the "Resistance Values" section of this chapter for acceptance criteria. If the resistance is not within limits, replace the de-ice boot.
  - (h) E13890K Design Only
    - 1 Remove all tie straps from the terminal mount strap and reinspect.

**CAUTION:** DO NOT PERMIT THE SOLVENT TO SEEP UNDER THE DE-ICE BOOT OR THE TERMINAL MOUNT STRAP.

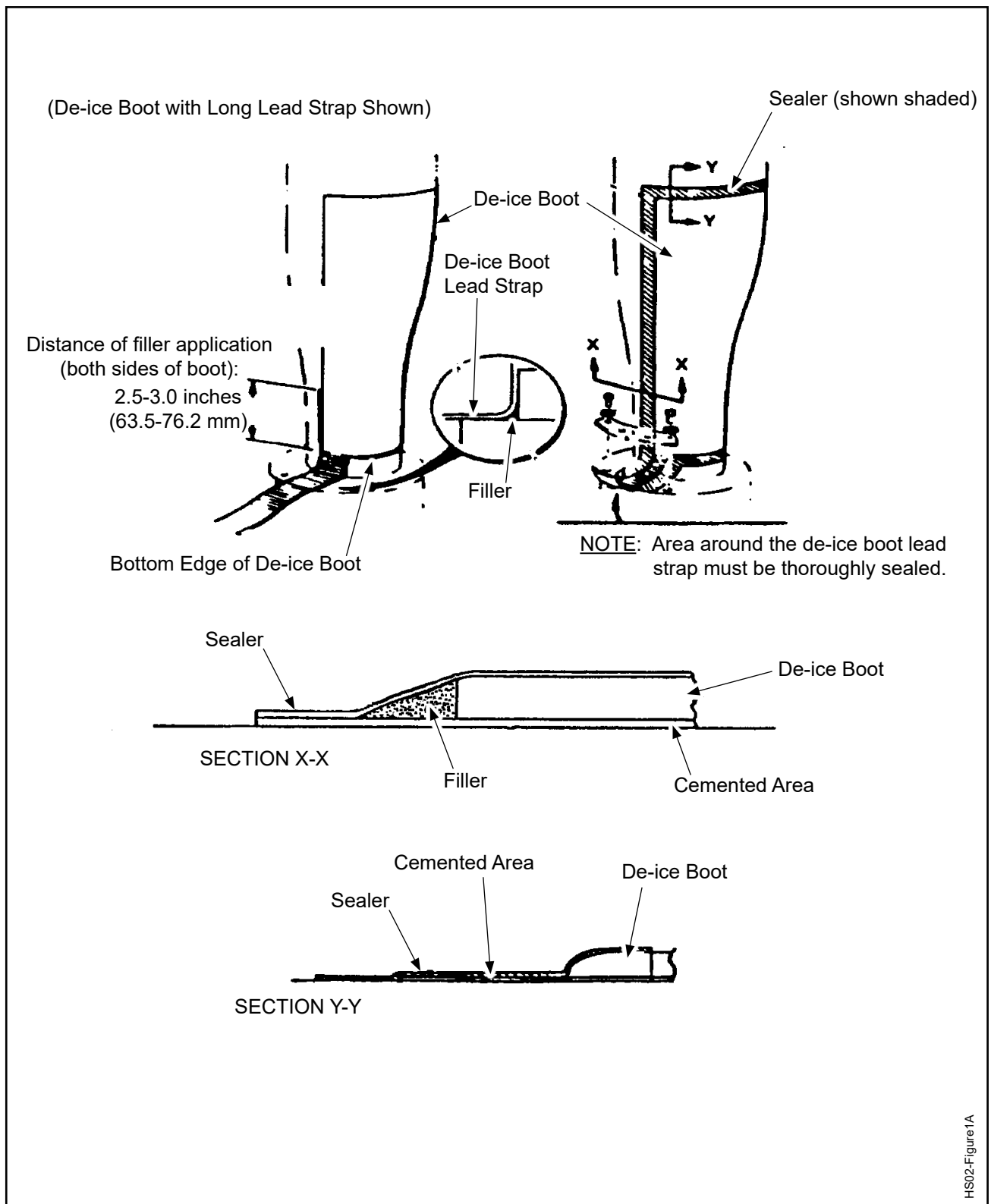
- 2 Using a clean cloth dampened with solvent MEK CM106, MPK CM219, or toluene CM41, remove all visible adhesive from around the de-ice boot outboard of the 7.0 inch (177.8 mm) blade station.

**N. Filler Application**

- (1) Apply filler in accordance with the section, "Filler Application" in this chapter.



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De-ice Boot Filler and Paint Sealer Application (Primary Method)

Figure 3-18

## O. Paint Sealer Application

**CAUTION:** USE PAINT SEALER ON EVERY DE-ICE BOOT TO PROTECT THE ADHESIVE BOND LINE AND PREVENT BLADE CORROSION UNDER THE DE-ICE BOOT.

- (1) The paint sealer for a de-ice boot is Mixture Number 5. Refer to the Material Information section of this chapter for mixture requirements.
- (2) Masking Application - Refer to Figure 3-16 and Figure 3-18
  - (a) Apply masking material to the blade and boot so that when the paint sealer is applied, it will cover sections of the blade (minimum overlap) as follows:
    - 1 All areas of exposed adhesive
    - 2 0.50 inch (6.35 mm) of the blade surface around the edge of the de-ice boot on Kevlar® blades, 0.25 inch on graphite blades
    - 3 1.5 inch (38.1 mm) of the de-ice boot edges
    - 4 All areas of exposed filler
  - (b) E13890K Design Only
    - 1 Apply masking material to protect the threaded mounts on the terminal mount strap.
- (3) Paint Sealer Application Procedure
  - (a) Prepare paint sealer black polane paint, Mix #5.
  - (b) Apply two even layers of the paint sealer to the area around the de-ice boot.
  - (c) Apply an even layer of paint sealer on the filler at the edges of the restrainer strap.
  - (d) Verify that the paint sealer completely covers all areas filled with filler CM9 or filler CM161.
  - (e) Remove all masking material immediately.
    - 1 Permit the paint sealer to cure for approximately 30 minutes before handling the blade.
  - (f) E13890K blades only:
    - 1 Install a MS3367-2-0 tie strap over the terminal mount strap tabs.
    - 2 Position the buckle of the tie strap between the two wire mounting standoffs.
    - 3 Force the tie strap outboard against the inboard edge of the largest diameter machined winding as the strap is tightened.
    - 4 Secure the tie strap using a tie gun TE332.

P. Erosion Tape CM158

- (1) If applicable, install erosion tape CM158 in accordance with the section, "erosion Tape CM158 Removal/Installation" in this chapter.

Q. Final Inspection

(1) Procedures

- (a) After de-ice boot paint sealer application, permit a minimum of 8 hours drying time before making an inspection.
- (b) Examine the edges of the de-ice boot and restrainer strap, if applicable, to make sure that they are bonded tightly.
  - 1 If the de-ice boot or restrainer strap, if applicable, is not tight, re-bond loose areas, permit to cure, and re-apply filler and paint sealer.
  - 2 If not previously accomplished, verify the correct distance from shank to the de-ice boot edge. Refer to Table 3-3.
- (c) Perform an electrical resistance check. Refer to Table 3-5 in the "Resistance Values" section of this chapter for resistance limits.

R. Minimum Required Dry/Cure Times

- (1) Wait a minimum of 12 hours after the de-ice boot Installation procedure is completed before starting the aircraft engine.
- (2) Wait a minimum of 24 hours after the de-ice boot Installation procedure is completed before operating the de-ice system.
  - (a) The filler and paint sealer will not be fully cured at this point. Operation in adverse conditions may damage the filler and paint sealer.

## 8. Filler Application (Metal and Composite Blades)

### A. Filler Requirements

**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:** THE ADHESIVE USED TO BOND THE DE-ICE BOOT TO THE BLADE MUST CURE FOR A MINIMUM OF EIGHT HOURS BEFORE THE APPLICATION OF THE FILLER. THE FILLER TENDS TO DISSOLVE THE ADHESIVE.

- (1) Filler is required on all composite blades with a tapered (thin) edge de-ice boot installed, on a de-ice boot with a long lead strap, i.e., a lead strap three inches or longer, on a de-ice boot with a tab, on a restrainer strap, and on a terminal mount strap.
- (2) Application of filler CM161 is highly recommended for composite blade models NC9208K, E9193(B,K), E10950P( )K,B and E13890K.
- (3) For all other de-ice boot applications, the application of filler is recommended, but not required.
- (4) Most later design de-ice boots have a tapered (thin) edge.
  - (a) Blade model LM10585AB+4, although not fitted with a tapered de-ice boot, requires the application of filler because of the folded design of the de-ice boot.
  - (b) Filler is recommended, but not required on a composite blade with a non-tapered edge de-ice boot. Refer to Table 3-4 for a list of composite blades with non-tapered edge de-ice boots.

Blade Model	De-ice Boot Part Number
M10083K	4(E, H)2336-12
LM10585ANK+4	4(E, H)2336-12
M10877K	4(E, H)2336-12

**Non-tapered Edge Composite Blade Designs**  
**Table 3-4**

B. Filler Application Procedures - All Except E13890K Blades

(1) Primary Method - Application of filler CM9

(a) Masking

- 1 Apply masking material from the inboard edge of the de-ice boot to approximately 3.0 inches (76.2 mm) outboard on the face and camber-sides of the blade.
  - a Masking material on the boot-side should be approximately to the edge of the boot.
  - b Masking material on the blade-side should permit the filler to be approximately 0.250 inch (6.35 mm) wide.
- 2 Masking along the bottom edge of the de-ice boot is optional. Refer to Figure 3-18.

**CAUTION:** FILLER CM9 CAN DISSOLVE ADHESIVE CM10. IF FILLER CM9 IS USED, CURE THE ADHESIVE CM10 FOR A MINIMUM OF EIGHT HOURS BEFORE THE FILLER CM9 IS APPLIED.

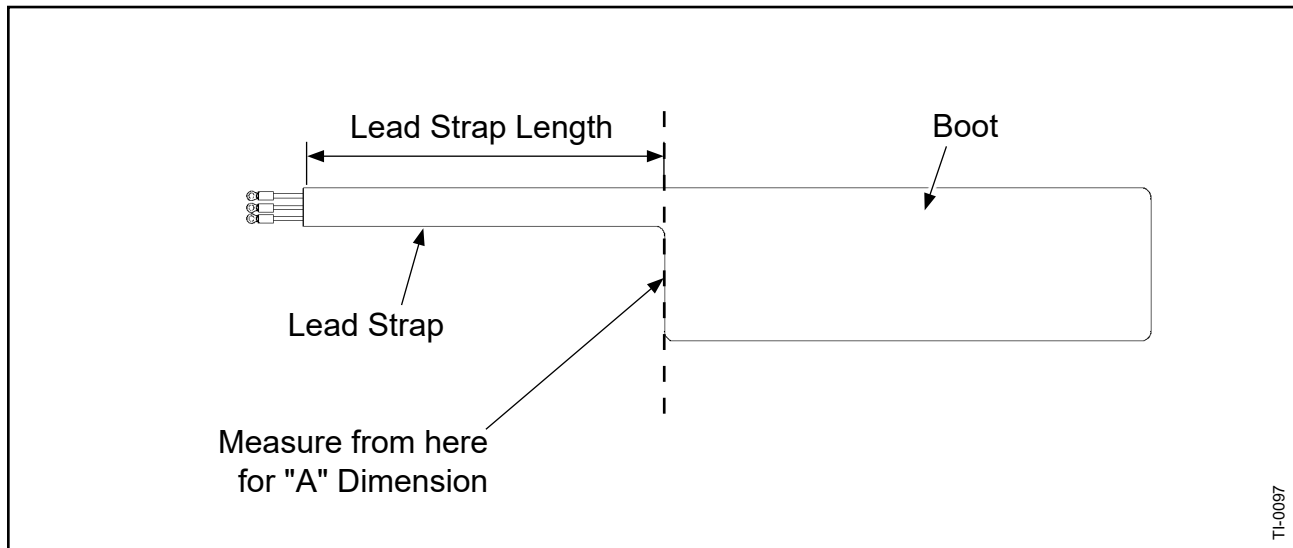
- (b) Sealant CM9 is used as a filler to blend the de-ice boot edge with the blade surface and to protect the bond lines from contaminants on the de-ice boot, tab, lead strap, or restrainer strap.

- 1 CM9 replaces CM91, that was previously specified as a filler for a de-ice boot.

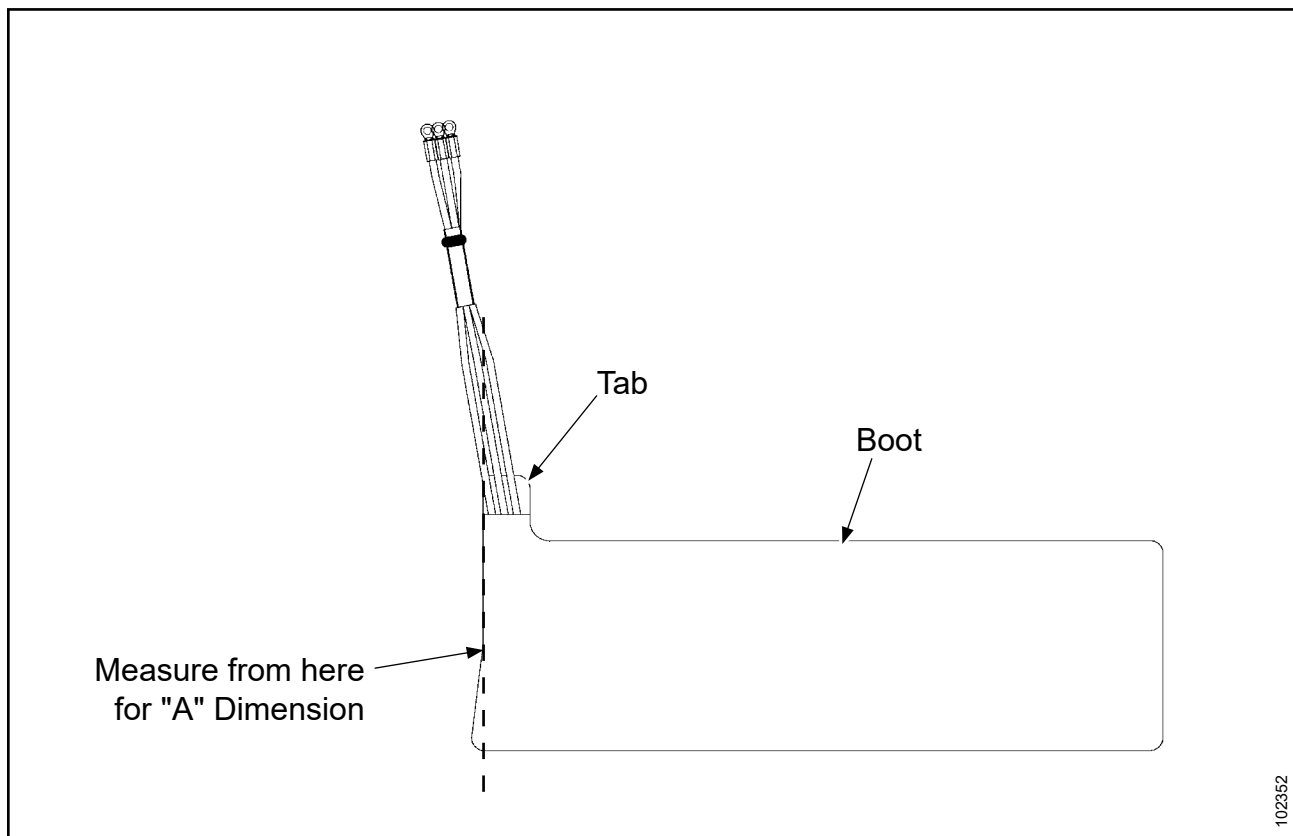
- (c) Apply an even fillet of filler to the edge of the de-ice boot/blade bond line.

- 1 Apply the filler along the inboard 2.5-3.0 inches (63.5-76.2 mm) of the de-ice boot on both the face and camber-sides of the blade. Refer to Figure 3-18.
- 2 Apply an even fillet of filler along the bottom edge of the de-ice boot. Refer to Figure 3-18.
- 3 Using a 0.5 inch (12.7 mm) straight edge, smooth the filler between the de-ice boot and the blade.
  - a The fillet should be flush with the masked areas.
  - b Immediately remove the masking material.

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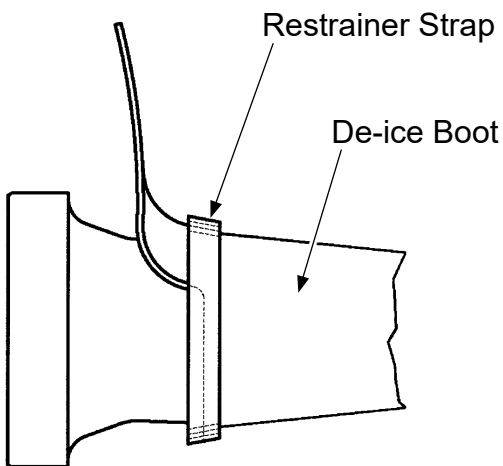
**De-ice Boot with a Lead Strap**  
**Figure 3-19**



**De-ice Boot with a Tab**  
**Figure 3-20**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

- (d) Filler is required on a de-ice boot with a lead strap that is 3.0 inches (76.2 mm) or longer, on a de-ice boot with a tab, and on a restrainer strap. Refer to Figure 3-19, Figure 3-20, and Figure 3-21.
  - 1 For a de-ice boot with a long lead strap, apply a fillet of filler around the lead strap edges. Refer to Figure 3-18.
  - 2 For a de-ice boot with a tab, apply an even fillet of filler along the edges of the tab. Refer to Figure 3-18.
  - 3 For a boot with a restrainer strap installed, apply an even bead of filler CM9 under the lead strap, and along the inboard and outboard edges of the restrainer strap. Refer to Figure 3-18.
- (e) For a boot with standard lead wire exits, make sure that the filler seals the area where the lead wires exit the de-ice boot.
- (f) Permit the filler to cure for a minimum of 20 minutes before applying the paint sealer.

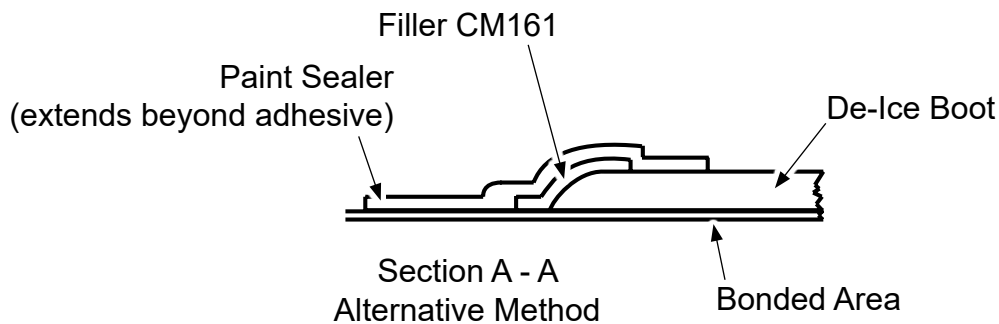
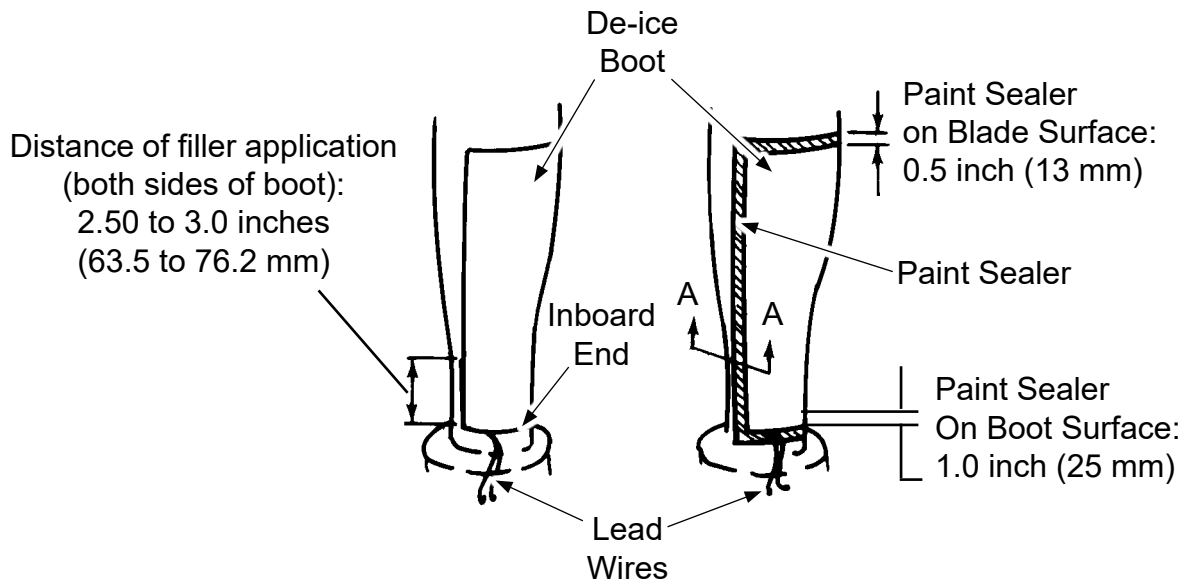


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**Restrainer Strap  
Figure 3-21**

**HARTZELL ICE PROTECTION SYSTEM  
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(De-ice Boot with Standard Lead Wire Exits Shown)



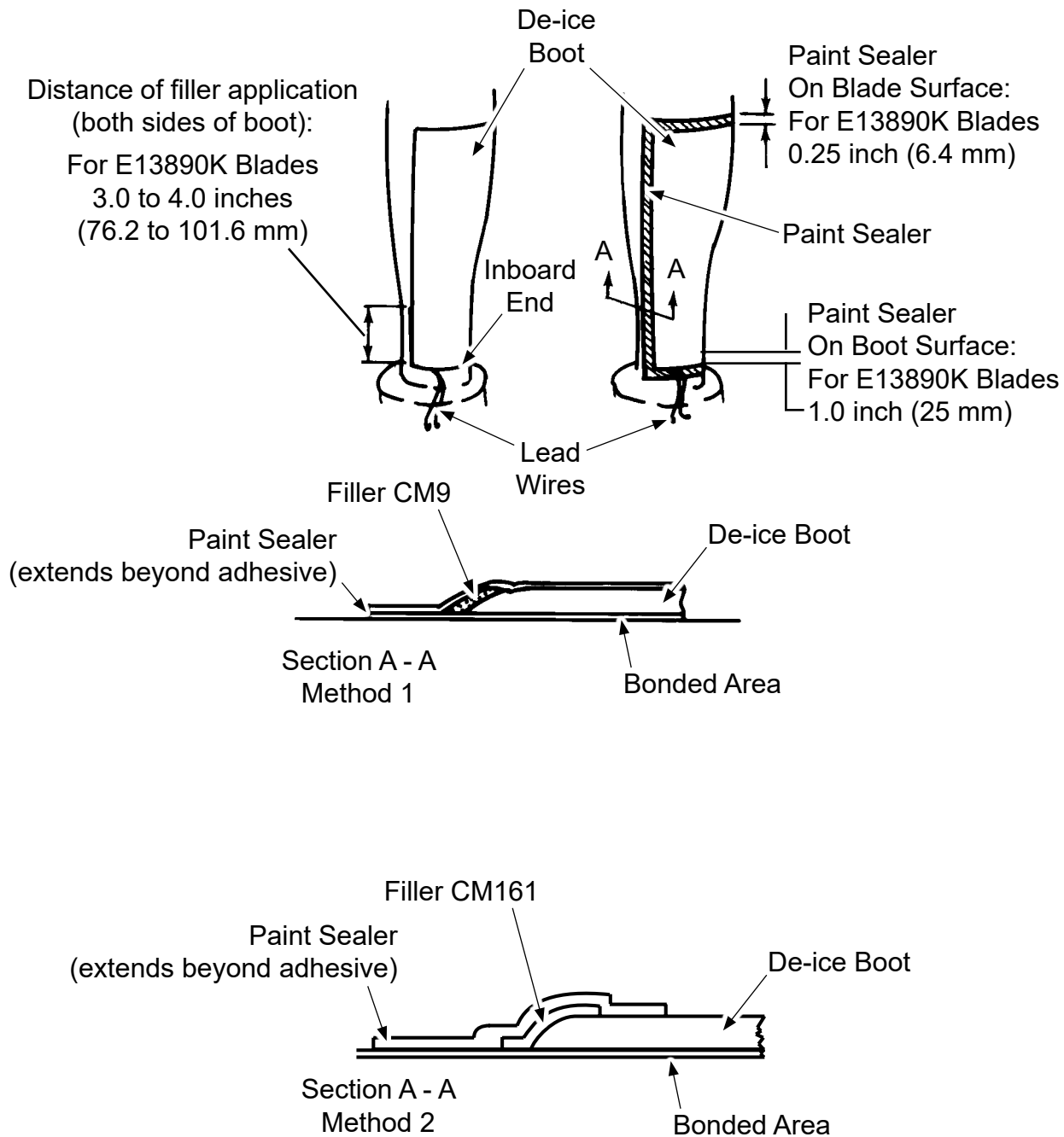
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**De-ice Boot Filler and Paint Sealer Application (Alternative Method)**  
**Figure 3-22**



- (2) Alternative Method - Application of filler CM161
  - (a) Apply masking material on the inboard section of the de-ice boot to outboard 3.0 inches (76.2 mm) as follows:
    - 1 Apply masking material on the blade surface, 0.25 inch (6.4 mm) from the edge of the de-ice boot and tab if applicable, on both the face and camber-sides of the blade.
    - 2 Apply masking material on the de-ice boot surface, 0.25 inch (6.4 mm) from the edge of the de-ice boot and tab if applicable, on both the face and camber-sides of the blade.
  - (b) For a de-ice boot with a long lead strap, using a brush, apply an even layer of filler CM161 between the masked areas along the inboard edges of the de-ice boot to 2.50 to 3.00 inches (63.5 to 76.2 mm) outboard on the face and camber-sides of the blade, under the lead strap, and along the edges of the lead strap. Refer to Figure 3-22.
    - 1 To determine if the de-ice boot has a long lead strap, i.e., a lead strap three inches or longer, measure the rubber portion of the strap from the de-ice boot body. Refer to Figure 3-19.
  - (c) For a de-ice boot with a tab, using a brush, apply an even layer of filler CM161 between the masked areas along the inboard edges of the de-ice boot to 2.50 to 3.00 inches (63.5 to 76.2 mm) outboard along the de-ice boot on the face and camber-sides of the blade and along the edges of the tab.
  - (d) For a boot with standard lead wire exits, apply an even layer of filler CM161 between the masked areas along the inboard edges of the de-ice boot to the 2.50 to 3.00 inches (63.5 to 76.2 mm) outboard on the face and camber-sides of the blade. Apply filler CM161 under and over the lead wires where the lead wires exit the de-ice boot.
  - (e) For a boot with a restrainer strap installed, using a brush, apply an even layer of filler CM161 between the masked areas along the inboard edges of the de-ice boot to 2.50 to 3.00 inches (63.5 to 76.2 mm) outboard on the face and camber-sides of the blade, under the lead strap, and along the inboard and outboard edges of the restrainer strap.
  - (f) Permit the filler to cure for a minimum of 2 hours before applying the paint sealer.

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**De-ice Boot Filler and Paint Sealer Application (E13890K Blades Only)**

**Figure 3-23**

**C. Filler Application Procedures - E13890K Blades Only**

**(1) Method 1 - Application of filler CM9.**

- (a) Apply an even bead of filler CM9 approximately 0.125 to 0.188 inch (3.18 to 4.76 mm) in diameter along the inboard edges of the de-ice boot to 3.0 to 4.0 inches (76.2 to 101.6 mm) outboard on the face and camber-sides of the blade. Refer to Figure 3-23.
- (b) Apply an even bead of filler CM9 approximately 0.125 to 0.188 inch (3.18 to 4.76 mm) in diameter along the inboard and outboard edges of the terminal mount strap, including the edges of each tab.
  - 1 Apply the filler to cover all bond lines.
  - 2 Apply the filler over the bond line created where the ends of the strap overlap.
- (c) Permit the filler to cure for a minimum of 20 minutes before applying the paint sealer.

**(2) Method 2 - Application of filler CM161**

- (a) Apply masking material on the inboard section of the de-ice boot to outboard 3.0 to 4.0 inches (76.2 to 101.6 mm) as follows:
  - 1 Apply masking material on the blade surface, 0.25 inch (6.4 mm) from the edge of the de-ice boot on both the face and camber-sides of the blade and along the edges of the terminal mount strap tabs.
  - 2 Apply masking material on the de-ice boot surface, 0.25 inch (6.4 mm) from the edge of the de-ice boot on both the face and camber-sides of the blade.
- (b) Using a brush, apply an even layer of CM161 around the de-ice boot between the masked areas of the de-ice boot edges from the inboard end of the de-ice boot to 3.0 to 4.0 inches (76.2 to 101.6 mm) outboard on the face and camber-sides of the blade. Refer to Figure 3-23.
- (c) Apply masking material to the blade just outboard and inboard of the large diameter winding and around the tabs of the terminal mount strap.
- (d) Apply a generous amount of filler CM161, approximately 0.125 to 0.25 inch (3.2 to 6.4 mm) inch wide, to:
  - 1 The inboard and outboard edges of the terminal mount straps to cover all the bond joint locations
  - 2 The inboard flap and screw mount locations
  - 3 Any voids

- (e) Using a poly brush or glove, feather the surfaces to form a smooth transition from the strap to the blade surface.
- (f) Using a clean cloth dampened with solvent CM11, remove any excess filler.
- (g) Remove the masking material before curing the filler.
- (h) Permit the filler to cure for a minimum of 2 hours before applying the paint sealer.

## 9. De-ice Boot Repair - E13890 Blades Only

### A. Procedure

**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.

- (1) This repair requires trimming of the de-ice boot.
- (2) Do not trim more than 0.25 inch (6.350 mm) per side from the original width of blade de-ice boot.

**CAUTION:** BE CAREFUL NOT TO DAMAGE BLADE LAMINATES WHILE TRIMMING. DO NOT TRIM MORE THAN IS NECESSARY.

- (3) Trim the excessive debonded edges of the de-ice boot from the blade.
- (4) Using a clean, lint-free cloth (or acid brush) soaked in MEK CM106, MPK CM219, or toluene CM41 clean all accessible areas of blade and debonded area of the de-ice boot.
- (5) Apply adhesive CM10 to the de-ice boot and blade, at the debond, using the procedures and cure times specified in this chapter.
- (6) Apply filler to the edge of the de-ice boot in accordance with the section, "Filler Application" in this chapter.

**NOTE:** Complete curing of the filler is not required before Paint Seal application.

- (7) Prepare paint sealer (black polane paint, Mix #5 in accordance with Paint and Finish chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).
- (8) Apply paint sealer CM33. Refer to the "Paint Sealer Application" section in this chapter.

- (9) Apply two even coats of the paint sealer to the area around the de-ice boot.

**CAUTION:** EVEN AFTER 24 HOURS CURE TIME, THE FILLER AND SEALER WILL NOT BE FULLY CURED. OPERATION IN ADVERSE CONDITIONS MAY DAMAGE THE FILLER AND SEALER.

- (10) Permit the paint to cure for approximately 30 minutes before handling the blade.

## 10. Terminal Mount Strap Repair - E-13890 Blades Only

### A. Procedure

**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.

- (1) Using a clean, lint-free cloth (or acid brush) soaked in MEK CM106, MPK CM219, or toluene CM41, clean all accessible areas of the winding and the debonded area of the terminal mount strap.
  - (a) Make sure all traces of grease are removed from under the terminal mount strap.
- (2) Apply the adhesive.
  - (a) There are three different adhesive options available for terminal mount strap repair.
    - 1 Adhesive Application, Option A
      - a Mix adhesive CM10 thoroughly.
      - b At the debond, apply one even layer of the adhesive CM10 to the terminal mount strap and windings.
    - 2 Adhesive Application, Option B

**CAUTION:** THOROUGHLY STIR ADHESIVE CURING AGENT BEFORE MIXING IT WITH THE ADHESIVE BECAUSE THE INGREDIENTS OF THE CURING AGENT MAY HAVE SEPARATED.

      - a Mixing Instructions for CM114-1
        - 1) Mix 9 parts adhesive CM79 with 1 part adhesive curing agent CM114-1 by volume. Thoroughly mix until a consistent color tone is present.

b Mixing Instructions for CM114-2

- 1) Mix 2 parts curing agent CM114-2 to 100 parts adhesive CM79 by weight. Thoroughly mix until a consistent color tone is present.

3 Adhesive Application, Option C

CAUTION: THOROUGHLY SHAKE THE CONTAINER OF ADHESIVE CURING AGENT CM218 BEFORE MIXING IT WITH THE ADHESIVE BECAUSE THE INGREDIENTS OF THE CURING AGENT MAY HAVE SEPARATED.

- a Mix adhesive CM217 with the adhesive curing agent CM218 in accordance with the manufacturer's technical data sheet. Thoroughly mix until a consistent color tone is present.
- b At the debond, apply one even layer of the adhesive mixture to the terminal mount strap and windings.
- c Tack life is 10 to 20 minutes.

- (3) Install a locally procured tie strap to hold the terminal mount strap in place while curing.
- (4) Permit the restrainer strap installation to dry (cure) a minimum of 8 hours before applying filler and paint sealer.
- (5) Apply filler to the edge of the terminal mount strap in accordance with the section "Filler Application" in this chapter.
- (6) Apply paint sealer CM33. Refer to the section "Paint Sealer Application" in this chapter.
- (7) Upon completion of repair, make sure that the terminal screws are tight.

## 11. Resistance Values

### A. General

- (1) Locate the part number of the applicable de-ice boot in Table 3-5 to determine the permitted resistance range for the boot.

**HARTZELL ICE PROTECTION SYSTEM  
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Part Number	Circuit	1 Boot	
		Minimum Ohms	Maximum Ohms
4H1188-( )		4.58	5.26
7931-4E1188-( )		4.58	5.26
4H1214-( )		1.00	1.10
7931-4E1214-( )		1.00	1.10
7931-4E1270-( )		3.54	3.92
7931-4E1525-( )		2.71	2.95
4H1601-( )		4.58	5.26
7931-4E1601-( )		4.58	5.26
7931-4E1746-( )		51.00	56.30
4H1895-( )		1.00	1.10
7931-4E1895-( )		1.00	1.10
7931-4E1956-( )		4.53	5.21
7931-4E2152-( )		4.58	5.26
4H2200-( )		Refer to Table A	
7931-4E2200-( )		4.70	4.90
4H2271-( )		Refer to Table A	
7931-4E2271-( )		4.70	4.90
4H2292-( )		Refer to Table B	
7931-4E2292-( )		1.04	1.12
4H2303-( )		Refer to Table B	
7931-4E2303-( )		1.04	1.12
7931-4E2336-10		3.42	3.65
4H2336-12		Refer to Table C	
7931-4E2336-12		3.06	3.38
4H2351-( )		Refer to Table D	
7931-4E2351-( )		2.10	2.23
7931-4E2520-( )		2.10	2.23
4H2560-( )		Refer to Table E	
7931-4E2560-( )		3.26	3.60
4H2575-( )		Refer to Table E	
7931-4E2575-( )		3.26	3.60
7931-4E2585-( )		4.56	5.06
4H2595-( )		Refer to Table F	

**NOTE 1:** Dash series of de-ice boot designates minor changes (lead or installation configuration). Unless otherwise stated, dash series of de-ice boot does not affect resistance value.

**De-ice Boot Resistance Values  
Table 3-5**

**HARTZELL ICE PROTECTION SYSTEM  
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Part Number	Circuit	1 Boot	
		Minimum Ohms	Maximum Ohms
7931-4E2595-( )		3.80	4.10
4H2598-( )	Inboard	Refer to Table G	
	Outboard	Refer to Table G	
7931-4E2598-( )	Inboard	3.44	3.80
	Outboard	3.48	3.84
4H2635-10		3.85	4.25
7931-4E2635-( )		3.85	4.25
7931-4E2650-( )		3.85	4.25
7931-4E2702-( )		4.68	5.16
7931-4E2715-( )		4.58	5.26
7931-4E2716-( )		4.68	5.16
7931-4E2762-( )	Inboard	1.92	2.13
	Outboard	2.12	2.36
4H2824-10		Refer to Table C	
7931-4E2824-10		3.059	3.381
7931-4E2836-( )		1.15	1.25
7931-4E2837-( )		1.15	1.25
4H2839-( )		Refer to Table O	
7931-4E2839-( )		19.38	21.53
4H2890-( )		1.54	1.65
7931-4E2890-( )		1.54	1.65
7931-4E2950-( )		3.44	3.60
7931-4E3006-( )		1.23	1.44
4H3017-( )		Refer to Table H	
7931-4E3017-( )		2.68	2.97
7931-4E3020-( )		1.72	1.90
4H3035-10		Refer to Table I	
7931-4E3035-10		2.14	2.37
4H3048-( )		Refer to Table F	
7931-4E3048-( )		3.80	4.10
4H3051-( )		Refer to Table J	
7931-4E3051-( )		1.76	1.95
4H3055-( )		Refer to Table K	

**NOTE 1:** Dash series of de-ice boot designates minor changes (lead or installation configuration). Unless otherwise stated, dash series of de-ice boot does not affect resistance value.

**De-ice Boot Resistance Values  
Table 3-5, Continued**



**HARTZELL ICE PROTECTION SYSTEM  
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Part Number	Circuit	1 Boot	
		Minimum Ohms	Maximum Ohms
7931-4E3055-( )		2.45	2.71
4H3064-( )		Refer to Table L	
7931-4E3064-( )		4.67	5.16
4H3101-( )		Refer to Table M	
7931-4E3101-( )		3.43	3.72
7931-4E3227-1	Inboard	5.02	5.54
	Outboard	4.95	5.47
4H3400-( )		Refer to Table E	
7931-4E3400-( )		3.26	3.60
4H3436-10		3.15	3.49
7931-4E3436-10		3.15	3.49
4H3462-( )		2.96	3.27
7931-4E3462-( )		2.96	3.27
4H3997-( )		4.12	4.56
7931-4E3997-( )		4.12	4.56
4H4048-( ) Refer to Note 3	Wires 1-2	Refer to Table N	
	Wires 1-3	Refer to Table N	
	Wires 2-3	Refer to Table N	
7931-4E4048-( )		216.38	229.78
4H4072-1		4.58	5.26
7931-4E4072-1		4.58	5.26
4H4072-2		Refer to Note 2	
7931-4E4072-2		Refer to Note 2	
7931-5E2233-( )		1.54	1.65
7931-5E2412-( )		34.42	38.04
7931-5E2429-( ) Refer to Note 3	Wires A-B	106.9	118.1
	Wires A-C	106.6	117.8
	Wires B-C	105.6	118.0

**NOTE 1:** Dash series of de-ice boot designates minor changes (lead or installation configuration). Unless otherwise stated, dash series of de-ice boot does not affect resistance value.

**NOTE 2:** Non-functional boot, install same as functional. For airfoil purposes - no resistance check is required.

**NOTE 3:** Three phase AC type systems require three separate resistance checks. Wires are labeled for reference (A, B, and C) or (1, 2, and 3).

**De-ice Boot Resistance Values  
Table 3-5, Continued**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

Part Number	Circuit	1 Boot	
		Minimum Ohms	Maximum Ohms
5H2429-( ) Refer to Note 3	Wires A-B	105.6	118.0
	Wires A-C	105.6	118.0
	Wires B-C	105.6	118.0
101773-( )		1.00	1.10
102196		Refer to Table A	
102197( )		Refer to Table Q	
102338( )		Refer to Table E	
102341		Refer to Note 2	
102352		4.58	5.26
102510		Refer to Table A	
102643		Refer to Table A	
102657		Refer to Table A	
102663		Refer to Table A	
102746		Refer to Table A	
102811		4.58	5.26
102855		Refer to Table J	
102878		4.58	5.26
102972		4.12	4.56
103020 Refer to Note 3	Wires 1-2	Refer to Table N	
	Wires 1-3	Refer to Table N	
	Wires 2-3	Refer to Table N	
103258		4.58	5.26
103291		Refer to Table A	
103503		Refer to Table A	
103505		Refer to Table E	
103601( )		Refer to Table L	
103679		1.00	1.10

**NOTE 1:** Dash series of de-ice boot designates minor changes (lead or installation configuration). Unless otherwise stated, dash series of de-ice boot does not affect resistance value.

**NOTE 2:** Non-functional boot, install same as functional.  
For airfoil purposes - no resistance check is required.

**NOTE 3:** Three phase AC type systems require three separate resistance checks. Wires are labeled for reference (A, B, and C) or (1, 2, and 3).

**De-ice Boot Resistance Values  
Table 3-5, Continued**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

Part Number	Circuit	1 Boot	
		Minimum Ohms	Maximum Ohms
103680		4.58	5.26
103701		Refer to Table A	
103771		Refer to Table E	
103880( )		Refer to Table A	
104112		Refer to Table A	
104155		Refer to Table A	
104220 Refer to NOTE 3	Wires 1-2	137.1	151.5
	Wires 1-3	137.1	151.5
	Wires 2-3	137.1	151.5
104221 Refer to NOTE 3	Wires A-B	99.05	109.48
	Wires A-C	99.05	109.48
	Wires B-C	99.05	109.48
104276 Refer to NOTE 3	Wires A-B	213.2	235.5
	Wires A-C	213.2	235.5
	Wires B-C	213.2	235.5
104729		Refer to Table A	
104878		Refer to Table A	
104286		Refer to Table G	
104294		Refer to Table E	
104510		Refer to Table K	
104512		4.58	5.26
105316		Refer to Table A	
105327		Refer to Table E	
105503		4.58	5.26
105622		Refer to Table P	
105981		4.20	4.37
106167		6.13	6.73
106453		Refer to Table E	
106523		4.58	5.26
106562		4.32	4.68
106830( )		Refer to Table A	
106959		4.14	4.42
107160( )		4.32	4.68

**NOTE 3:** Three phase AC type systems require three separate resistance checks. Wires are labeled for reference (A, B, and C) or (1, 2, and 3).

**De-ice Boot Resistance Values  
Table 3-5, Continued**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

Part Number	Circuit	1 Boot	
		Minimum Ohms	Maximum Ohms
107253	Inboard	Refer to Table G	
	Outboard	Refer to Table G	
107383		4.96	5.12
107551		5.92	6.28
107687		4.58	5.26
107975(X11)		3.78	4.18
108108		Refer to Table Q	
108368		4.41	4.73
108586		Refer to Table K	
B-6442		31.94	35.30
H6975-11		4.58	5.26
SMR2263		1.56	1.72
SMR9050		4.70	4.90

**NOTE 1:** Dash series of de-ice boot designates minor changes (lead or installation configuration). Unless otherwise stated, dash series of de-ice boot does not affect resistance value.

**De-ice Boot Resistance Values  
Table 3-5, Continued**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

Temperature Range °F	Temperature Range °C	Min Ohms	Max Ohms
0 to 5	-17.8 to -15.0	4.51	4.71
5 to 10	-15.0 to -12.2	4.52	4.72
10 to 15	-12.2 to -9.4	4.54	4.74
15 to 20	-9.4 to -6.7	4.55	4.75
20 to 25	-6.7 to -3.9	4.57	4.77
25 to 30	-3.9 to -1.1	4.58	4.78
30 to 35	-1.1 to 1.7	4.60	4.80
35 to 40	1.7 to 4.4	4.61	4.81
40 to 45	4.4 to 7.2	4.63	4.83
45 to 50	7.2 to 10.0	4.64	4.84
50 to 55	10.0 to 12.8	4.66	4.86
55 to 60	12.8 to 15.6	4.67	4.87
60 to 65	15.6 to 18.3	4.69	4.89
65 to 70	18.3 to 21.1	4.70	4.90
70 to 75	21.1 to 23.9	4.72	4.92
75 to 80	23.9 to 26.7	4.73	4.93
80 to 85	26.7 to 29.4	4.75	4.95
85 to 90	29.4 to 32.2	4.76	4.96
90 to 95	32.2 to 35.0	4.78	4.98
95 to 100	35.0 to 37.8	4.79	4.99

**NOTE:** Ambient air temperature may not represent the de-ice boot temperature. Solar or infrared heating will affect the temperature of the de-ice boot.

GEN-108517

**Resistance as a Function of Temperature  
Table A**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

Temperature Range °F	Temperature Range °C	Min Ohms	Max Ohms
0 to 5	-17.8 to -15.0	0.85	0.93
5 to 10	-15.0 to -12.2	0.86	0.94
10 to 15	-12.2 to -9.4	0.88	0.96
15 to 20	-9.4 to -6.7	0.89	0.97
20 to 25	-6.7 to -3.9	0.91	0.99
25 to 30	-3.9 to -1.1	0.92	1.00
30 to 35	-1.1 to 1.7	0.94	1.02
35 to 40	1.7 to 4.4	0.95	1.03
40 to 45	4.4 to 7.2	0.97	1.05
45 to 50	7.2 to 10.0	0.98	1.06
50 to 55	10.0 to 12.8	1.00	1.08
55 to 60	12.8 to 15.6	1.01	1.09
60 to 65	15.6 to 18.3	1.03	1.11
65 to 70	18.3 to 21.1	1.04	1.12
70 to 75	21.1 to 23.9	1.06	1.14
75 to 80	23.9 to 26.7	1.07	1.15
80 to 85	26.7 to 29.4	1.09	1.17
85 to 90	29.4 to 32.2	1.10	1.18
90 to 95	32.2 to 35.0	1.12	1.20
95 to 100	35.0 to 37.8	1.13	1.21

**NOTE:** Ambient air temperature may not represent the de-ice boot temperature. Solar or infrared heating will affect the temperature of the de-ice boot.

GEN-108517

**Resistance as a Function of Temperature  
Table B**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

<b>Temperature Range °F</b>	<b>Temperature Range °C</b>	<b>Min Ohms</b>	<b>Max Ohms</b>
0 to 5	-17.8 to -15.0	2.87	3.19
5 to 10	-15.0 to -12.2	2.88	3.20
10 to 15	-12.2 to -9.4	2.90	3.22
15 to 20	-9.4 to -6.7	2.91	3.23
20 to 25	-6.7 to -3.9	2.93	3.25
25 to 30	-3.9 to -1.1	2.94	3.26
30 to 35	-1.1 to 1.7	2.96	3.28
35 to 40	1.7 to 4.4	2.97	3.29
40 to 45	4.4 to 7.2	2.99	3.31
45 to 50	7.2 to 10.0	3.00	3.32
50 to 55	10.0 to 12.8	3.02	3.34
55 to 60	12.8 to 15.6	3.03	3.35
60 to 65	15.6 to 18.3	3.05	3.37
65 to 70	18.3 to 21.1	3.06	3.38
70 to 75	21.1 to 23.9	3.08	3.40
75 to 80	23.9 to 26.7	3.09	3.41
80 to 85	26.7 to 29.4	3.11	3.43
85 to 90	29.4 to 32.2	3.12	3.44
90 to 95	32.2 to 35.0	3.14	3.46
95 to 100	35.0 to 37.8	3.15	3.47

**NOTE:** Ambient air temperature may not represent the de-ice boot temperature. Solar or infrared heating will affect the temperature of the de-ice boot.

GEN-108517

**Resistance as a Function of Temperature  
Table C**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

Temperature Range °F	Temperature Range °C	Inboard		Outboard	
		Min Ohms	Max Ohms	Min Ohms	Max Ohms
0 to 5	-17.8 to -15.0	1.91	2.04	1.91	2.04
5 to 10	-15.0 to -12.2	1.92	2.05	1.92	2.05
10 to 15	-12.2 to -9.4	1.94	2.07	1.94	2.07
15 to 20	-9.4 to -6.7	1.95	2.08	1.95	2.08
20 to 25	-6.7 to -3.9	1.97	2.10	1.97	2.10
25 to 30	-3.9 to -1.1	1.98	2.11	1.98	2.11
30 to 35	-1.1 to 1.7	2.00	2.13	2.00	2.13
35 to 40	1.7 to 4.4	2.01	2.14	2.01	2.14
40 to 45	4.4 to 7.2	2.03	2.16	2.03	2.16
45 to 50	7.2 to 10.0	2.04	2.17	2.04	2.17
50 to 55	10.0 to 12.8	2.06	2.19	2.06	2.19
55 to 60	12.8 to 15.6	2.07	2.20	2.07	2.20
60 to 65	15.6 to 18.3	2.09	2.22	2.09	2.22
65 to 70	18.3 to 21.1	2.10	2.23	2.10	2.23
70 to 75	21.1 to 23.9	2.12	2.25	2.12	2.25
75 to 80	23.9 to 26.7	2.13	2.26	2.13	2.26
80 to 85	26.7 to 29.4	2.15	2.28	2.15	2.28
85 to 90	29.4 to 32.2	2.16	2.29	2.16	2.29
90 to 95	32.2 to 35.0	2.18	2.31	2.18	2.31
95 to 100	35.0 to 37.8	2.19	2.32	2.19	2.32

**NOTE:** Ambient air temperature may not represent the de-ice boot temperature. Solar or infrared heating will affect the temperature of the de-ice boot.

GEN-108517

**Resistance as a Function of Temperature  
Table D**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

<b>Temperature Range °F</b>	<b>Temperature Range °C</b>	<b>Min Ohms</b>	<b>Max Ohms</b>
0 to 5	-17.8 to -15.0	3.07	3.41
5 to 10	-15.0 to -12.2	3.08	3.42
10 to 15	-12.2 to -9.4	3.10	3.44
15 to 20	-9.4 to -6.7	3.11	3.45
20 to 25	-6.7 to -3.9	3.13	3.47
25 to 30	-3.9 to -1.1	3.14	3.48
30 to 35	-1.1 to 1.7	3.16	3.50
35 to 40	1.7 to 4.4	3.17	3.51
40 to 45	4.4 to 7.2	3.19	3.53
45 to 50	7.2 to 10.0	3.20	3.54
50 to 55	10.0 to 12.8	3.22	3.56
55 to 60	12.8 to 15.6	3.23	3.57
60 to 65	15.6 to 18.3	3.25	3.59
65 to 70	18.3 to 21.1	3.26	3.60
70 to 75	21.1 to 23.9	3.28	3.62
75 to 80	23.9 to 26.7	3.29	3.63
80 to 85	26.7 to 29.4	3.31	3.65
85 to 90	29.4 to 32.2	3.32	3.66
90 to 95	32.2 to 35.0	3.34	3.68
95 to 100	35.0 to 37.8	3.35	3.69

**NOTE:** Ambient air temperature may not represent the de-ice boot temperature. Solar or infrared heating will affect the temperature of the de-ice boot.

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**Resistance as a Function of Temperature  
Table E**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

<b>Temperature Range °F</b>	<b>Temperature Range °C</b>	<b>Min Ohms</b>	<b>Max Ohms</b>
0 to 5	-17.8 to -15.0	3.61	3.91
5 to 10	-15.0 to -12.2	3.62	3.92
10 to 15	-12.2 to -9.4	3.64	3.94
15 to 20	-9.4 to -6.7	3.65	3.95
20 to 25	-6.7 to -3.9	3.67	3.97
25 to 30	-3.9 to -1.1	3.68	3.98
30 to 35	-1.1 to 1.7	3.70	4.00
35 to 40	1.7 to 4.4	3.71	4.01
40 to 45	4.4 to 7.2	3.73	4.03
45 to 50	7.2 to 10.0	3.74	4.04
50 to 55	10.0 to 12.8	3.76	4.06
55 to 60	12.8 to 15.6	3.77	4.07
60 to 65	15.6 to 18.3	3.79	4.09
65 to 70	18.3 to 21.1	3.80	4.10
70 to 75	21.1 to 23.9	3.82	4.12
75 to 80	23.9 to 26.7	3.83	4.13
80 to 85	26.7 to 29.4	3.85	4.15
85 to 90	29.4 to 32.2	3.86	4.16
90 to 95	32.2 to 35.0	3.88	4.18
95 to 100	35.0 to 37.8	3.89	4.19

**NOTE:** Ambient air temperature may not represent the de-ice boot temperature. Solar or infrared heating will affect the temperature of the de-ice boot.

GEN-108517

**Resistance as a Function of Temperature  
Table F**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

Temperature Range °F	Temperature Range °C	Inboard		Outboard	
		Min Ohms	Max Ohms	Min Ohms	Max Ohms
0 to 5	-17.8 to -15.0	3.25	3.61	3.29	3.65
5 to 10	-15.0 to -12.2	3.26	3.62	3.30	3.66
10 to 15	-12.2 to -9.4	3.28	3.64	3.32	3.68
15 to 20	-9.4 to -6.7	3.29	3.65	3.33	3.69
20 to 25	-6.7 to -3.9	3.31	3.67	3.35	3.71
25 to 30	-3.9 to -1.1	3.32	3.68	3.36	3.72
30 to 35	-1.1 to 1.7	3.34	3.70	3.38	3.74
35 to 40	1.7 to 4.4	3.35	3.71	3.39	3.75
40 to 45	4.4 to 7.2	3.37	3.73	3.41	3.77
45 to 50	7.2 to 10.0	3.38	3.74	3.42	3.78
50 to 55	10.0 to 12.8	3.40	3.76	3.44	3.80
55 to 60	12.8 to 15.6	3.41	3.77	3.45	3.81
60 to 65	15.6 to 18.3	3.43	3.79	3.47	3.83
65 to 70	18.3 to 21.1	3.44	3.80	3.48	3.84
70 to 75	21.1 to 23.9	3.46	3.82	3.50	3.86
75 to 80	23.9 to 26.7	3.47	3.83	3.51	3.87
80 to 85	26.7 to 29.4	3.49	3.85	3.53	3.89
85 to 90	29.4 to 32.2	3.50	3.86	3.54	3.90
90 to 95	32.2 to 35.0	3.52	3.88	3.56	3.92
95 to 100	35.0 to 37.8	3.53	3.89	3.57	3.93

**NOTE:** Ambient air temperature may not represent the de-ice boot temperature. Solar or infrared heating will affect the temperature of the de-ice boot.

GEN-108517

**Resistance as a Function of Temperature  
Table G**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

<b>Temperature Range °F</b>	<b>Temperature Range °C</b>	<b>Min Ohms</b>	<b>Max Ohms</b>
0 to 5	-17.8 to -15.0	2.49	2.78
5 to 10	-15.0 to -12.2	2.50	2.79
10 to 15	-12.2 to -9.4	2.52	2.81
15 to 20	-9.4 to -6.7	2.53	2.82
20 to 25	-6.7 to -3.9	2.55	2.84
25 to 30	-3.9 to -1.1	2.56	2.85
30 to 35	-1.1 to 1.7	2.58	2.87
35 to 40	1.7 to 4.4	2.59	2.88
40 to 45	4.4 to 7.2	2.61	2.90
45 to 50	7.2 to 10.0	2.62	2.91
50 to 55	10.0 to 12.8	2.64	2.93
55 to 60	12.8 to 15.6	2.65	2.94
60 to 65	15.6 to 18.3	2.67	2.96
65 to 70	18.3 to 21.1	2.68	2.97
70 to 75	21.1 to 23.9	2.70	2.99
75 to 80	23.9 to 26.7	2.71	3.00
80 to 85	26.7 to 29.4	2.73	3.02
85 to 90	29.4 to 32.2	2.74	3.03
90 to 95	32.2 to 35.0	2.76	3.05
95 to 100	35.0 to 37.8	2.77	3.06

**NOTE:** Ambient air temperature may not represent the de-ice boot temperature. Solar or infrared heating will affect the temperature of the de-ice boot.

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**Resistance as a Function of Temperature  
Table H**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

Temperature Range °F	Temperature Range °C	Min Ohms	Max Ohms
0 to 5	-17.8 to -15.0	1.95	2.18
5 to 10	-15.0 to -12.2	1.96	2.19
10 to 15	-12.2 to -9.4	1.98	2.21
15 to 20	-9.4 to -6.7	1.99	2.22
20 to 25	-6.7 to -3.9	2.01	2.24
25 to 30	-3.9 to -1.1	2.02	2.25
30 to 35	-1.1 to 1.7	2.04	2.27
35 to 40	1.7 to 4.4	2.05	2.28
40 to 45	4.4 to 7.2	2.07	2.30
45 to 50	7.2 to 10.0	2.08	2.31
50 to 55	10.0 to 12.8	2.10	2.33
55 to 60	12.8 to 15.6	2.11	2.34
60 to 65	15.6 to 18.3	2.13	2.36
65 to 70	18.3 to 21.1	2.14	2.37
70 to 75	21.1 to 23.9	2.16	2.39
75 to 80	23.9 to 26.7	2.17	2.40
80 to 85	26.7 to 29.4	2.19	2.42
85 to 90	29.4 to 32.2	2.20	2.43
90 to 95	32.2 to 35.0	2.22	2.45
95 to 100	35.0 to 37.8	2.23	2.46

**NOTE:** Ambient air temperature may not represent the de-ice boot temperature. Solar or infrared heating will affect the temperature of the de-ice boot.

GEN-108517

**Resistance as a Function of Temperature  
Table I**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

<b>Temperature Range °F</b>	<b>Temperature Range °C</b>	<b>Min Ohms</b>	<b>Max Ohms</b>
0 to 5	-17.8 to -15.0	1.57	1.76
5 to 10	-15.0 to -12.2	1.58	1.77
10 to 15	-12.2 to -9.4	1.60	1.79
15 to 20	-9.4 to -6.7	1.61	1.80
20 to 25	-6.7 to -3.9	1.63	1.82
25 to 30	-3.9 to -1.1	1.64	1.83
30 to 35	-1.1 to 1.7	1.66	1.85
35 to 40	1.7 to 4.4	1.67	1.86
40 to 45	4.4 to 7.2	1.69	1.88
45 to 50	7.2 to 10.0	1.70	1.89
50 to 55	10.0 to 12.8	1.72	1.91
55 to 60	12.8 to 15.6	1.73	1.92
60 to 65	15.6 to 18.3	1.75	1.94
65 to 70	18.3 to 21.1	1.76	1.95
70 to 75	21.1 to 23.9	1.78	1.97
75 to 80	23.9 to 26.7	1.79	1.98
80 to 85	26.7 to 29.4	1.81	2.00
85 to 90	29.4 to 32.2	1.82	2.01
90 to 95	32.2 to 35.0	1.84	2.03
95 to 100	35.0 to 37.8	1.85	2.04

**NOTE:** Ambient air temperature may not represent the de-ice boot temperature. Solar or infrared heating will affect the temperature of the de-ice boot.

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**Resistance as a Function of Temperature  
Table J**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

Temperature Range °F	Temperature Range °C	Inboard		Outboard	
		Min Ohms	Max Ohms	Min Ohms	Max Ohms
0 to 5	-17.8 to -15.0	2.26	2.52	2.26	2.52
5 to 10	-15.0 to -12.2	2.27	2.53	2.27	2.53
10 to 15	-12.2 to -9.4	2.29	2.55	2.29	2.55
15 to 20	-9.4 to -6.7	2.30	2.56	2.30	2.56
20 to 25	-6.7 to -3.9	2.32	2.58	2.32	2.58
25 to 30	-3.9 to -1.1	2.33	2.59	2.33	2.59
30 to 35	-1.1 to 1.7	2.35	2.61	2.35	2.61
35 to 40	1.7 to 4.4	2.36	2.62	2.36	2.62
40 to 45	4.4 to 7.2	2.38	2.64	2.38	2.64
45 to 50	7.2 to 10.0	2.39	2.65	2.39	2.65
50 to 55	10.0 to 12.8	2.41	2.67	2.41	2.67
55 to 60	12.8 to 15.6	2.42	2.68	2.42	2.68
60 to 65	15.6 to 18.3	2.44	2.70	2.44	2.70
65 to 70	18.3 to 21.1	2.45	2.71	2.45	2.71
70 to 75	21.1 to 23.9	2.47	2.73	2.47	2.73
75 to 80	23.9 to 26.7	2.48	2.74	2.48	2.74
80 to 85	26.7 to 29.4	2.50	2.76	2.50	2.76
85 to 90	29.4 to 32.2	2.51	2.77	2.51	2.77
90 to 95	32.2 to 35.0	2.53	2.79	2.53	2.79
95 to 100	35.0 to 37.8	2.54	2.80	2.54	2.80

**NOTE:** Ambient air temperature may not represent the de-ice boot temperature. Solar or infrared heating will affect the temperature of the de-ice boot.

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**Resistance as a Function of Temperature  
Table K**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

Temperature Range °F	Temperature Range °C	Inboard		Outboard	
		Min Ohms	Max Ohms	Min Ohms	Max Ohms
0 to 5	-17.8 to -15.0	4.48	4.97	4.48	4.97
5 to 10	-15.0 to -12.2	4.49	4.98	4.49	4.98
10 to 15	-12.2 to -9.4	4.51	5.00	4.51	5.00
15 to 20	-9.4 to -6.7	4.52	5.01	4.52	5.01
20 to 25	-6.7 to -3.9	4.54	5.03	4.54	5.03
25 to 30	-3.9 to -1.1	4.55	5.04	4.55	5.04
30 to 35	-1.1 to 1.7	4.57	5.06	4.57	5.06
35 to 40	1.7 to 4.4	4.58	5.07	4.58	5.07
40 to 45	4.4 to 7.2	4.60	5.09	4.60	5.09
45 to 50	7.2 to 10.0	4.61	5.10	4.61	5.10
50 to 55	10.0 to 12.8	4.63	5.12	4.63	5.12
55 to 60	12.8 to 15.6	4.64	5.13	4.64	5.13
60 to 65	15.6 to 18.3	4.66	5.15	4.66	5.15
65 to 70	18.3 to 21.1	4.67	5.16	4.67	5.16
70 to 75	21.1 to 23.9	4.69	5.18	4.69	5.18
75 to 80	23.9 to 26.7	4.70	5.19	4.70	5.19
80 to 85	26.7 to 29.4	4.72	5.21	4.72	5.21
85 to 90	29.4 to 32.2	4.73	5.22	4.73	5.22
90 to 95	32.2 to 35.0	4.75	5.24	4.75	5.24
95 to 100	35.0 to 37.8	4.76	5.25	4.76	5.25

**NOTE:** Ambient air temperature may not represent the de-ice boot temperature. Solar or infrared heating will affect the temperature of the de-ice boot.

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**Resistance as a Function of Temperature  
Table L**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

Temperature Range °F	Temperature Range °C	Min Ohms	Max Ohms
0 to 5	-17.8 to -15.0	3.24	3.53
5 to 10	-15.0 to -12.2	3.25	3.54
10 to 15	-12.2 to -9.4	3.27	3.56
15 to 20	-9.4 to -6.7	3.28	3.57
20 to 25	-6.7 to -3.9	3.30	3.59
25 to 30	-3.9 to -1.1	3.31	3.60
30 to 35	-1.1 to 1.7	3.33	3.62
35 to 40	1.7 to 4.4	3.34	3.63
40 to 45	4.4 to 7.2	3.36	3.65
45 to 50	7.2 to 10.0	3.37	3.66
50 to 55	10.0 to 12.8	3.39	3.68
55 to 60	12.8 to 15.6	3.40	3.69
60 to 65	15.6 to 18.3	3.42	3.71
65 to 70	18.3 to 21.1	3.43	3.72
70 to 75	21.1 to 23.9	3.45	3.74
75 to 80	23.9 to 26.7	3.46	3.75
80 to 85	26.7 to 29.4	3.48	3.77
85 to 90	29.4 to 32.2	3.49	3.78
90 to 95	32.2 to 35.0	3.51	3.80
95 to 100	35.0 to 37.8	3.52	3.81

**NOTE:** Ambient air temperature may not represent the de-ice boot temperature. Solar or infrared heating will affect the temperature of the de-ice boot.

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**Resistance as a Function of Temperature  
Table M**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

<b>Temperature Range °F</b>	<b>Temperature Range °C</b>	<b>Min Ohms</b>	<b>Max Ohms</b>
0 to 5	-17.8 to -15.0	216.2	229.6
5 to 10	-15.0 to -12.2	216.2	229.6
10 to 15	-12.2 to -9.4	216.2	229.6
15 to 20	-9.4 to -6.7	216.2	229.6
20 to 25	-6.7 to -3.9	216.2	229.6
25 to 30	-3.9 to -1.1	216.3	229.7
30 to 35	-1.1 to 1.7	216.3	229.7
35 to 40	1.7 to 4.4	216.3	229.7
40 to 45	4.4 to 7.2	216.3	229.7
45 to 50	7.2 to 10.0	216.3	229.7
50 to 55	10.0 to 12.8	216.3	229.7
55 to 60	12.8 to 15.6	216.4	229.8
60 to 65	15.6 to 18.3	216.4	229.8
65 to 70	18.3 to 21.1	216.4	229.8
70 to 75	21.1 to 23.9	216.4	229.8
75 to 80	23.9 to 26.7	216.4	229.8
80 to 85	26.7 to 29.4	216.4	229.8
85 to 90	29.4 to 32.2	216.4	229.8
90 to 95	32.2 to 35.0	216.5	229.9
95 to 100	35.0 to 37.8	216.5	229.9

**NOTE:** Ambient air temperature may not represent the de-ice boot temperature. Solar or infrared heating will affect the temperature of the de-ice boot.

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**Resistance as a Function of Temperature  
Table N**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

Temperature Range °F	Temperature Range °C	Min Ohms	Max Ohms
0 to 5	-17.8 to -15.0	19.18	21.33
5 to 10	-15.0 to -12.2	19.19	21.34
10 to 15	-12.2 to -9.4	19.21	21.36
15 to 20	-9.4 to -6.7	19.23	21.38
20 to 25	-6.7 to -3.9	19.24	21.39
25 to 30	-3.9 to -1.1	19.26	21.41
30 to 35	-1.1 to 1.7	19.27	21.42
35 to 40	1.7 to 4.4	19.29	21.44
40 to 45	4.4 to 7.2	19.31	21.46
45 to 50	7.2 to 10.0	19.32	21.47
50 to 55	10.0 to 12.8	19.34	21.49
55 to 60	12.8 to 15.6	19.35	21.50
60 to 65	15.6 to 18.3	19.37	21.52
65 to 70	18.3 to 21.1	19.38	21.53
70 to 75	21.1 to 23.9	19.40	21.55
75 to 80	23.9 to 26.7	19.42	21.57
80 to 85	26.7 to 29.4	19.43	21.58
85 to 90	29.4 to 32.2	19.45	21.60
90 to 95	32.2 to 35.0	19.46	21.61
95 to 100	35.0 to 37.8	19.48	21.63
100 to 105	37.8 to 40.6	19.50	21.65

**NOTE:** Ambient air temperature may not represent the de-ice boot temperature. Solar or infrared heating will affect the temperature of the de-ice boot.

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**Resistance as a Function of Temperature  
Table O**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

Temperature Range °F	Temperature Range °C	Inboard		Outboard	
		Min Ohms	Max Ohms	Min Ohms	Max Ohms
0 to 5	-17.8 to -15.0	4.77	4.93	4.77	4.93
5 to 10	-15.0 to -12.2	4.78	4.94	4.78	4.94
10 to 15	-12.2 to -9.4	4.80	4.96	4.80	4.96
15 to 20	-9.4 to -6.7	4.81	4.97	4.81	4.97
20 to 25	-6.7 to -3.9	4.83	4.99	4.83	4.99
25 to 30	-3.9 to -1.1	4.84	5.00	4.84	5.00
30 to 35	-1.1 to 1.7	4.86	5.02	4.86	5.02
35 to 40	1.7 to 4.4	4.87	5.03	4.87	5.03
40 to 45	4.4 to 7.2	4.89	5.05	4.89	5.05
45 to 50	7.2 to 10.0	4.90	5.06	4.90	5.06
50 to 55	10.0 to 12.8	4.92	5.08	4.92	5.08
55 to 60	12.8 to 15.6	4.93	5.09	4.93	5.09
60 to 65	15.6 to 18.3	4.95	5.11	4.95	5.11
65 to 70	18.3 to 21.1	4.96	5.12	4.96	5.12
70 to 75	21.1 to 23.9	4.98	5.14	4.98	5.14
75 to 80	23.9 to 26.7	4.99	5.15	4.99	5.15
80 to 85	26.7 to 29.4	5.01	5.17	5.01	5.17
85 to 90	29.4 to 32.2	5.02	5.18	5.02	5.18
90 to 95	32.2 to 35.0	5.04	5.20	5.04	5.20
95 to 100	35.0 to 37.8	5.05	5.21	5.05	5.21

**NOTE:** Ambient air temperature may not represent the de-ice boot temperature. Solar or infrared heating will affect the temperature of the de-ice boot.

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**Resistance as a Function of Temperature  
Table P**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

Temperature Range °F	Temperature Range °C	Inboard		Outboard	
		Min Ohms	Max Ohms	Min Ohms	Max Ohms
0 to 5	-17.8 to -15.0	11.41	12.21	11.41	12.21
5 to 10	-15.0 to -12.2	11.42	12.22	11.42	12.22
10 to 15	-12.2 to -9.4	11.44	12.24	11.44	12.24
15 to 20	-9.4 to -6.7	11.45	12.25	11.45	12.25
20 to 25	-6.7 to -3.9	11.47	12.27	11.47	12.27
25 to 30	-3.9 to -1.1	11.48	12.28	11.48	12.28
30 to 35	-1.1 to 1.7	11.50	12.30	11.50	12.30
35 to 40	1.7 to 4.4	11.51	12.31	11.51	12.31
40 to 45	4.4 to 7.2	11.53	12.33	11.53	12.33
45 to 50	7.2 to 10.0	11.54	12.34	11.54	12.34
50 to 55	10.0 to 12.8	11.56	12.36	11.56	12.36
55 to 60	12.8 to 15.6	11.57	12.37	11.57	12.37
60 to 65	15.6 to 18.3	11.59	12.39	11.59	12.39
65 to 70	18.3 to 21.1	11.60	12.40	11.60	12.40
70 to 75	21.1 to 23.9	11.62	12.42	11.62	12.42
75 to 80	23.9 to 26.7	11.63	12.43	11.63	12.43
80 to 85	26.7 to 29.4	11.65	12.45	11.65	12.45
85 to 90	29.4 to 32.2	11.66	12.46	11.66	12.46
90 to 95	32.2 to 35.0	11.68	12.48	11.68	12.48
95 to 100	35.0 to 37.8	11.69	12.49	11.69	12.49

**NOTE:** Ambient air temperature may not represent the de-ice boot temperature. Solar or infrared heating will affect the temperature of the de-ice boot.

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**Resistance as a Function of Temperature  
Table Q**

**HARTZELL ICE PROTECTION SYSTEM  
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**HARTZELL ICE PROTECTION SYSTEM  
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1. Cleaning Procedures (Rev. 1)

A. General Cleaning

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

B. Cleaning Steel Parts for Magnetic Particle Inspection

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

C. Cleaning Steel Parts for Cadmium Replating Procedures

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

D. Cleaning Aluminum Parts for Penetrant Inspection

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

E. Cleaning Aluminum Parts for Chromic Acid Anodizing Procedures

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

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## 1. Inspection Interval Requirements

### A. Life Limited Components

- (1) For information about life limited components and mandatory inspections, refer to the Airworthiness Limitations Chapter of this manual

### B. De-ice Systems

- (1) For de-ice system inspection requirements, refer to the section, "De-ice System Inspection Schedules/Procedures" in this chapter.

### C. Anti-ice Systems

- (1) For anti-ice system inspection requirements, refer to the section, "Anti-ice System Inspection Schedules/Procedures" in this chapter.

### D. Special Inspections (Lightning Strike, Fire, etc.)

- (1) For inspection requirements following a lightning strike, sudden stoppage, fire, or foreign object strike, refer to the section, "Special Inspections" in this chapter.

## 2. Dimensional Inspection

### A. Diameter Measurements

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

**HARTZELL ICE PROTECTION SYSTEM  
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3. De-ice System Inspection Schedules/Procedures

A. 200-Hour Inspection

- (1) At 200 flight hour intervals, not to exceed 12 calendar months, perform an inspection of the de-ice system in accordance with Table 5-1 in this chapter.
  - (a) The inspection/maintenance schedule specified by the airframe manufacturer and approved by the applicable airworthiness agency may not coincide with the inspection interval specified in this manual. The airframe manufacturer's schedule may be used but the calendar limit for the inspection interval cannot exceed 12 calendar months.
- (2) Perform additional inspections in accordance with the aircraft TC or STC holder's Instructions for Continued Airworthiness (ICA).

B. At Propeller Overhaul:

- (1) Inspect the components of the de-ice system in accordance with Table 5-2 in this chapter.
  - (a) For overhaul periods of Hartzell propellers, refer to Hartzell Propeller Service Letter HC-SL-61-61Y.



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

**De-ice System 200-Hour Inspection**

<b>Inspect</b>	<b>Serviceable Limits</b>	<b>Corrective Action</b>
<b>A. <u>DE-ICE BOOTS</u></b>		
(1) Visually examine for wrinkled, abraded, torn areas, or foreign object damage. Pay close attention to de-ice boot edges, blade leading edge, and where lead straps or wires exit the de-ice boot.	Minor damage is permitted. Damage through the de-ice boot to the blade is not permitted. Damage that exposes the de-ice boot heating element is not permitted.	If damage is greater than the serviceable limits, replace the de-ice boot.
(2) Visually examine for debond. Make sure of the bond at the de-ice boot edges, blade leading edge, and where lead straps or wires exit the de-ice boot.	Refer to the section, "De-ice/Anti-ice Boot Debond Limits" in this chapter.	Refer to the section, "De-ice/Anti-ice Boot Debond Limits" in this chapter.
(3) Visually examine the de-ice boot lead wires for a short or open circuit.	A short or open circuit is not permitted.	If arcing damage, a short, or an open wire is found, perform the "De-ice Boot Inspection for Overheating or a Short Circuit" in this chapter.
(4) If installed, visually examine the erosion tape for wear.	Minor wear is acceptable. Wear through the erosion tape is not permitted.	If erosion tape wear is greater than the serviceable limits, replace the erosion tape in accordance with the De-ice Boot Removal/Installation chapter in this manual.

**De-ice System 200-Hour Inspection  
Table 5-1, page 1 of 5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

**De-ice System 200-Hour Inspection**

<b>Inspect</b>	<b>Serviceable Limits</b>	<b>Corrective Action</b>
<b>B. <u>SLIP RING ASSEMBLY</u></b>		
(1) Visually examine for fuel or oil leakage contamination on the slip ring. Contamination may cause excess wear of the rings.	Excessive fuel or oil leak is not permitted.	Correct the fuel or oil leakage, then clean the slip ring with cleaning solvent CM106 or CM128.
(2) Visually examine the slip ring base for corrosion.	Corrosion is not permitted. The maximum permitted depth of pitting is 0.004 inch (0.10 mm). The maximum permitted total accumulated area of pitting is 2 sq. inches (1290 sq. mm)	Remove corrosion using an abrasive pad CM47 or equivalent to a maximum depth of 0.008 inch (0.20 mm), then apply a chemical conversion coating in accordance with Hartzell Propeller Standard Practices Manual 202A (61-01-02). The maximum permitted total accumulated area of repairs is 5 sq. inches (3225 sq. mm). Repairs that affect the form, fit, or function of the slip ring are not permitted. If the corrosion cannot be removed, or if the pitting exceeds the serviceable limits, replace the slip ring assembly.
(3) Visually examine the insulating compound.	Gouges, chips, or cracks in the insulating compound are not permitted	If there are gouges, chips, or cracks in the insulating compound, replace the slip ring assembly.
	Separation of the copper rings from the insulating compound is not permitted.	If the copper rings have separated from the insulating compound, replace the slip ring assembly.

**De-ice System 200-Hour Inspection  
Table 5-1, page 2 of 5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

**De-ice System 200-Hour Inspection**

Inspect	Serviceable Limits	Corrective Action
B. <u>SLIP RING ASSEMBLY, continued</u>		
(4) Visually examine the slip ring wires, studs, mounting screws, and terminals.	Obvious damage that could adversely affect proper fit or function is not permitted.	<p>Terminal end replacement may be performed in accordance with industry standard practices.</p> <p>If slip ring lead wire is frayed or broken, remove the slip ring and replace the leadwire in accordance with the Repair/Modification chapter of this manual or replace the slip ring assembly.</p> <p>If an integral wire is broken inside the slip ring, repair is not permitted, replace the slip ring assembly.</p> <p>If a stud is damaged or broken, remove the slip ring and replace the slip ring assembly.</p> <p>If a mounting screw (1141) on a 4H2422 and the 7931-4E2422 slip ring assembly is damaged, broken, or missing, replace the screw in accordance with the Repair/Modification chapter of this manual or replace the slip ring assembly.</p> <p>If damage to wires, studs, or heat shrink tubing is beyond the serviceable limits, replace the slip ring assembly.</p>

**De-ice System 200-Hour Inspection  
Table 5-1, page 3 of 5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

**De-ice System 200-Hour Inspection**

<b>Inspect</b>	<b>Serviceable Limits</b>	<b>Corrective Action</b>
<b>C. <u>HARDWARE</u> (including Hub Clamping Bolts included in de-ice kits)</b>		
(1) Visually examine all hardware components for corrosion.	Corrosion is not permitted.	If there is corrosion, replace the affected hardware component(s).
(2) Visually examine all hardware components for damage.	Minor nicks and scratches are permitted.	If the damage is greater than the permitted serviceable limit, replace the affected hardware component(s).
	Damage that affects the fit and/or function of the hardware component is not permitted.	
(3) Visually examine for loose and/or missing hardware.	Loose/missing hardware is not permitted.	Tighten any loose hardware component(s).  Replace any missing hardware component(s).
<b>D. <u>WIRE HARNESS</u></b>		
(1) Visually examine the wire harness and protective tubing for damage/chafing.	Damage/chafing that exposes the wiring is not permitted.	If the damage is greater than the permitted serviceable limits, replace the wire harness and/or protective tubing.  (NOTE: Reposition the wire harness to prevent future damage/chafing).
(2) Visually examine the wire harness for arcing damage caused by a short/open circuit.	Arcing damage is not permitted.  A short/open circuit is not permitted.	If there is arcing damage, or a short/open circuit, replace the wire harness

**De-ice System 200-Hour Inspection  
Table 5-1, page 4 of 5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

**De-ice System 200-Hour Inspection**

Inspect	Serviceable Limits	Corrective Action
<b>E. <u>TERMINAL MOUNT STRAP - E13890(K) Blades only</u></b>		
(1) Visually examine the terminal mount strap for puckers and wrinkles.	Puckers/wrinkles are permitted if the edges of the strap are sealed to blade, and do not affect the proper fit or function of the strap.	If the pucker/wrinkles are greater than the permitted serviceable limits, replace the terminal mount strap.
Apply 6 lbs. of force to the wire harness toward the tip of the blade, and check the terminal mount strap for debonding.	Debonds up to 70% of the total strap width are permitted.	If the debonding is greater than the permitted serviceable limits, replace the terminal mount strap.
(NOTE: Apply the force to the wire harness between the adel clamp securing the wire harness to the terminal mount strap, and the de-ice harness bracket that is attached to the hub).		

**F. DE-ICE SYSTEM COMPONENTS (except the Slip Ring Assembly)**

- (1) Inspect the de-ice system components in accordance with Table 5-2 in this chapter.

**G. DE-ICE SYSTEM CHECK**

- (1) Perform the "De-ice System Operational Check: Without Engine Power" in accordance with the instructions in this chapter.
- (2) Perform the "De-ice System Operational Check: Rotating" in accordance with the instructions in this chapter.
- (3) Perform the "De-ice Boot Circuit Resistance Inspection" in accordance with the instructions in this chapter.

**De-ice System 200-Hour Inspection  
Table 5-1, page 5 of 5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

**De-ice System Component Inspection Criteria**

<b>Inspect</b>	<b>Serviceable Limits</b>	<b>Corrective Action</b>
<b>A. <u>SLIP RING ASSEMBLY</u></b>		
ATTENTION: This complete inspection is only required at overhaul.		
(1) Visually examine for fuel or oil leakage contamination on the slip ring. Contamination may cause excess wear of the rings.	Excessive fuel or oil leak is not permitted.	Correct the fuel or oil leakage. Clean the slip ring with cleaning solvent CM106 or CM128 and an abrasive pad, CM47 or equivalent. Follow by wiping with cleaning solvent CM106 or CM128.
(2) Visually examine for corroded hardware.	Corroded hardware is not permitted.	Replace any corroded hardware.
(3) Visually examine for damage and loose or missing hardware and tubing.	Minor damage, such as, nicks and scratches, is permitted. Loose or missing hardware or tubing is not permitted.	Replace any damaged or missing hardware or tubing. Tighten any loose hardware and safety as required.
(4) Visually examine the slip ring base for corrosion.	Corrosion is not permitted. The maximum permitted depth of pitting is 0.004 inch (0.10 mm). The maximum permitted total accumulated area of pitting is 2 sq. inches (1290 sq. mm)	Remove corrosion using an abrasive pad CM47 or equivalent to a maximum depth of 0.008 inch (0.20 mm), then apply a chemical conversion coating in accordance with Hartzell Propeller Standard Practices Manual 202A (61-01-02). The maximum permitted total accumulated area of repairs is 5 sq. inches (3225 sq. mm). Repairs that affect the form, fit, or function of the slip ring are not permitted. If the corrosion cannot be removed, or if the pitting exceeds the serviceable limits, replace the slip ring assembly.

**De-ice System Component Inspection Criteria  
Table 5-2, page 1 of 15**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

**De-ice System Component Inspection Criteria**

<b>Inspect</b>	<b>Serviceable Limits</b>	<b>Corrective Action</b>
<b>A. <u>SLIP RING ASSEMBLY, continued</u></b>		
(5) Visually examine the slip ring for damage or excessive wear.	The maximum permitted depth of damage or wear across the wear path is 0.007 inch (0.178 mm).	For damage or wear that is less than the serviceable limits, clean the slip ring using an abrasive pad CM47 or equivalent. If the damage or wear is greater than the serviceable limits, resurface the slip ring in accordance with the Repair/Modification chapter in this manual.
(6) Visually examine the slip ring base for damage.	Minor damage, such as, nicks and scratches, is permitted.  A crack or structural damage is not permitted.	If damage is greater than the serviceable limits, replace the slip ring assembly.  If the slip ring is cracked or damaged structurally, replace the slip ring assembly.
(7) Visually examine the slip ring for wobble.	If wobble is observed, perform the slip ring run-out check in this chapter.	Complete the "De-ice Slip Ring Run-out Check" in accordance with the instructions in this chapter.
(8) Visually examine the insulating compound.	Gouges, chips, or cracks in the insulating compound are not permitted  More than six exposed pits of missing insulating compound are not permitted. Pits must be less than 0.060 inch (1.52 mm) wide. Pits must be no more than 0.020 inch (0.50 mm) deep. Pits must be at least 0.30 inch (7.6 mm) apart.	If there are gouges, chips, or cracks in the insulating compound, replace the slip ring assembly.  If exposed pits of missing insulating compound are greater than the serviceable limits, replace the slip ring assembly.

**De-ice System Component Inspection Criteria  
Table 5-2, page 2 of 15**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

**De-ice System Component Inspection Criteria**

<b>Inspect</b>	<b>Serviceable Limits</b>	<b>Corrective Action</b>
<b>A. <u>SLIP RING ASSEMBLY, continued</u></b>		
(8) Visually examine the insulating compound - continued.	Separation of the copper rings from the insulating compound is not permitted.	If the copper rings have separated from the insulating compound, replace the slip ring assembly.
(9) Visually examine the slip ring wires, studs, mounting screws, and terminals.	Obvious damage that could adversely affect proper fit or function is not permitted.	Terminal end replacement may be performed in accordance with industry standard practices. If slip ring lead wire is frayed or broken, remove the slip ring and replace the leadwire in accordance with the Repair/Modification chapter of this manual or replace the slip ring assembly. If an integral wire is broken inside the slip ring, repair is not permitted, replace the slip ring assembly. If a stud is damaged or broken, remove the slip ring and replace the slip ring assembly. If a mounting screw (1141) on a 4H2422 and the 7931-4E2422 slip ring assembly is damaged, broken, or missing, replace the screw in accordance with the Repair/Modification chapter of this manual or replace the slip ring assembly. If damage to wires, studs, or heat shrink tubing is beyond the serviceable limits, replace the slip ring assembly.

**De-ice System Component Inspection Criteria  
Table 5-2, page 3 of 15**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

**De-ice System Component Inspection Criteria**

<b>Inspect</b>	<b>Serviceable Limits</b>	<b>Corrective Action</b>
<b>B. <u>TERMINAL STRIPS (Bulkhead Mounted and Counterweight Mounted)</u></b>		
(1) Visually examine the terminal strip for general appearance.	Obvious damage that could adversely affect proper function is not permitted.	If damage exceeds serviceable limits, replace the part.
(2) Visually examine the terminal strip for cracks.	A crack is not permitted.	If there is a crack, replace the part.
(3) Visually examine the terminal strip and terminal studs for arcing damaged caused by a short out to each other or to the propeller hub.	Arcing damage is not permitted. A short or open circuit is not permitted.	If arcing damage or a short is found, replace the terminal strip.
<b>C. <u>BOLT, 3/8", HEX HEAD (Hub Clamping Bolt)</u></b>		
(1) <u>At overhaul only:</u> Hub clamping bolts that are included with de-ice kits must be inspected in accordance with the hub clamping bolt inspection criteria in the applicable Hartzell Propeller overhaul/maintenance manual.		

**De-ice System Component Inspection Criteria  
Table 5-2, page 4 of 15**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

**De-ice System Component Inspection Criteria**

<b>Inspect</b>	<b>Serviceable Limits</b>	<b>Corrective Action</b>
<b>D. <u>SPLIT MOUNTING PLATE</u></b>		
(1) Visually examine for general appearance.	Obvious damage that could adversely affect proper function is not permitted.	If damage exceeds serviceable limits, replace the split mounting plate.
(2) Visually examine for corrosion.	Active corrosion is not permitted. Pitting that could adversely affect proper function is not permitted.	Remove active corrosion with glass media blasting. If corrosion exceeds serviceable limits replace the split mounting plate.
(3) Visually examine for scratches.	Obvious scratches that could adversely affect proper function are not permitted.	Stone flat any raised material. Polishing is not permitted.
(4) Visually examine for scoring, gouging, or other damage from the mounting nuts.	Scoring, gouging, or other damage from the mounting nuts is not permitted.	Repair the split mounting plate in accordance with the Repair and Modification chapter in this manual.
(5) <u>At overhaul only:</u> Penetrant inspect the split mounting plate in accordance with the Penetrant Inspection chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).	A relevant indication is not permitted.	If there is a relevant indication, replace the split mounting plate.

**De-ice System Component Inspection Criteria  
Table 5-2, page 5 of 15**

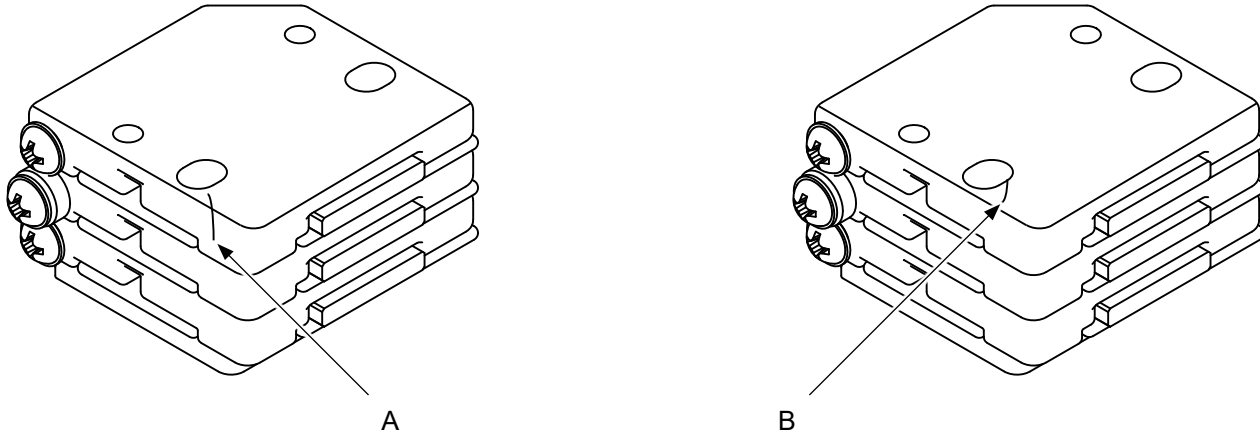
**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**




**De-ice System Component Inspection Criteria**

<b>Inspect</b>	<b>Serviceable Limits</b>	<b>Corrective Action</b>
<b>E. <u>SPACER (Airframe de-ice component)</u></b>		
(1) Visually examine for general appearance.	Obvious damage that could adversely affect proper function is not permitted.	If damage exceeds serviceable limits, replace the spacer.
(2) Visually examine for cracks.	A crack is not permitted.	If there is a crack, replace the spacer.
<b>F. <u>BRUSH BLOCK SHIM</u></b>		
(1) Visually examine for general appearance.	Obvious damage that could adversely affect proper function is not permitted.	If damage exceeds serviceable limits, replace the brush block shim.
(2) Visually examine for cracks.	A crack is not permitted.	If there is a crack, replace the brush block shim.
<b>G. <u>SWITCH, FACE PLATE</u></b>		
(1) Visually examine for general appearance.	Obvious damage that could adversely affect proper function is not permitted.	If damage exceeds serviceable limits, replace the switch face plate.
(2) Visually examine for cracks.	A crack is not permitted.	If there is a crack, replace the switch face plate.

**De-ice System Component Inspection Criteria  
Table 5-2, page 6 of 15**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**



Crack Example	Description
	A crack with visible separation is <u>not</u> permitted.
	A crack with <u>no</u> visible separation is referred to as a "hairline crack".
	A hairline crack with more than one origination/termination point (crack splits off) is <u>not</u> permitted.
A	A hairline crack that is visible on three or more surfaces is <u>not</u> permitted.
B	A hairline crack that intersects a mounting hole on the brush block module is <u>not</u> permitted.

**Modular Brush Block Assembly (Crack Identification)  
Figure 5-1**

**De-ice System Component Inspection Criteria**

Inspect	Serviceable Limits	Corrective Action
<b>H. <u>MODULAR BRUSH BLOCK ASSEMBLY</u></b>		
ATTENTION: If brush block replacement is required, refer to the Assembly chapter in this manual for alignment instructions.		
(1) Visually examine the brush block modules for damage or deformation.	Damage or deformation that can affect the function of the brush block assembly is not permitted.	If damage or deformation exceeds the permitted serviceable limits, replace the brush block module.
(2) Visually examine the brush block modules for grease, fuel, and/or carbon deposits.	Clean with stoddard solvent CM23 or equivalent and a soft bristle brush, as required.	Repair the source of leakage.
(3) Examine the brush in each brush block module for free movement.	The brushes must move freely in each module.	If the brush does not move freely, replace the brush block module.
(4) Visually examine the brush block modules for cracks. Refer to Figure 5-1.	<p>A crack with visible separation is not permitted.</p> <p>A crack with <u>no</u> visible separation is referred to as a hairline crack.</p> <p>Only one hairline crack for each brush block module is permitted.</p> <p>A hairline crack with more than one origination or termination point on a brush block module is not permitted.</p> <p>A hairline crack that intersects a mounting hole on a brush block module is not permitted.</p> <p>A hairline crack that is visible on three or more surfaces of a brush block module is not permitted.</p>	If the crack exceeds the permitted serviceable limits, replace the brush block module.

**De-ice System Component Inspection Criteria  
Table 5-2, page 7 of 15**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

**De-ice System Component Inspection Criteria**

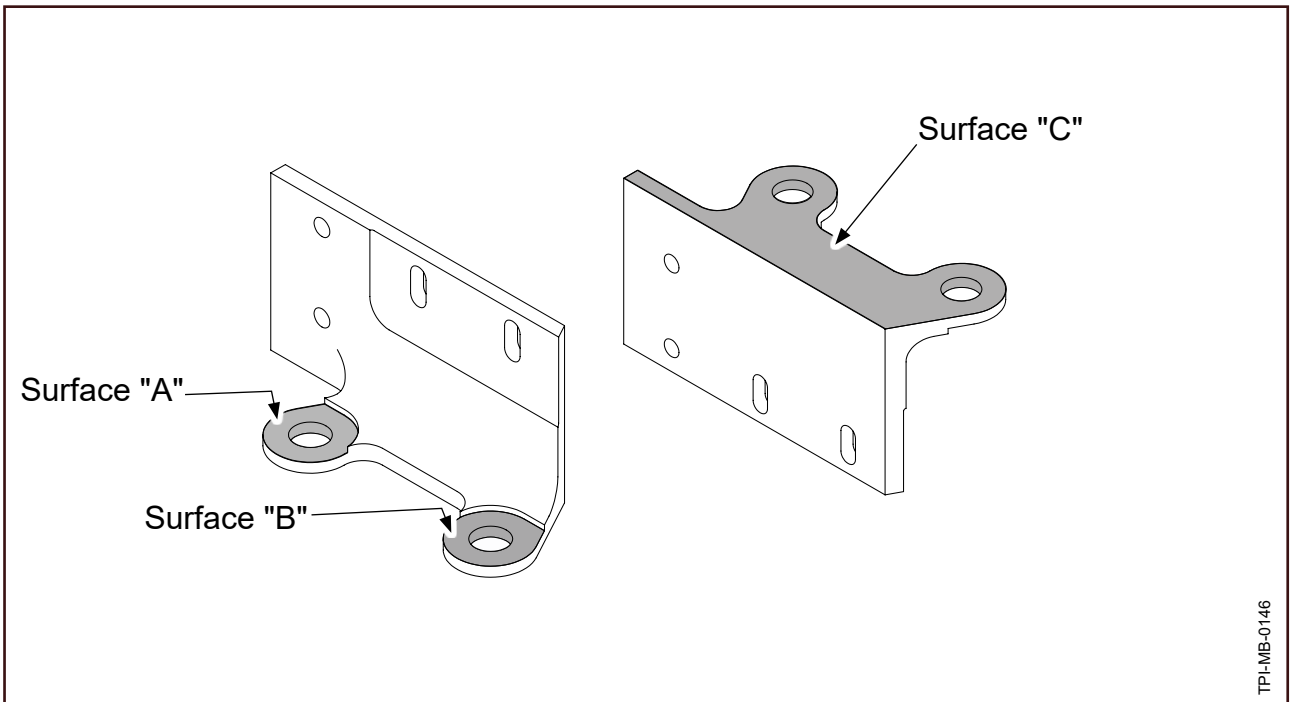
<b>Inspect</b>	<b>Serviceable Limits</b>	<b>Corrective Action</b>
<b>H. <u>MODULAR BRUSH BLOCK ASSEMBLY, continued</u></b>		
(5) Visually examine each brush for chipping, or breakage.	Chipping or breakage is not permitted.	If there is chipping or breakage, replace the brush(es) in accordance with the Repair/Modification chapter of this manual.
(6) <u>At overhaul only:</u> Visually examine each brush for wear.  If there is wear, measure the wear.	Uneven wear is not permitted.  Serviceable limits for wear are specified in the section, "Brush Measurement" in this chapter.	If there is uneven wear or if the wear exceeds the permitted serviceable limits, replace the brush in accordance with the Repair/Modification chapter of this manual.
<b>I. <u>BRUSH BLOCK BRACKET - and - SPARKOVER BRACKET</u></b>		
(1) Visually examine for general appearance.	Obvious damage that could adversely affect proper function is not permitted.	If damage exceeds serviceable limits, replace the bracket.
(2) Visually examine for cracks.	A crack is not permitted.	If there is a crack, replace the bracket.
(3) <u>At overhaul only:</u> Visually examine for corrosion.	Pitting in excess of 0.062 inch (1.575 mm) diameter and 0.010 inch (0.254 mm) deep is not permitted.  Active corrosion is not permitted.	If pitting exceeds serviceable limits, replace the bracket.  Using glass media blasting, remove active corrosion.

**De-ice System Component Inspection Criteria  
Table 5-2, page 8 of 15**

**De-ice System Component Inspection Criteria**

Inspect	Serviceable Limits	Corrective Action
I. <u>BRUSH BLOCK BRACKET - and - SPARKOVER BRACKET, continued</u>		
(4) <u>At overhaul only:</u> Brush Block Bracket p/n 106335 only: Visually examine the alodine coating on Surfaces "A", "B", and "C" on the brush block bracket for coverage. Refer to Figure 5-2.	Complete coverage is required on Surfaces "A", "B", and "C".	If the coverage is less than the permitted serviceable limits, alodine the surface(s) in accordance with the Chromic Acid Anodizing chapter of Hartzell Propeller Standard Practices manual 202A (61-01-02).

**De-ice System Component Inspection Criteria  
Table 5-2, page 9 of 15**



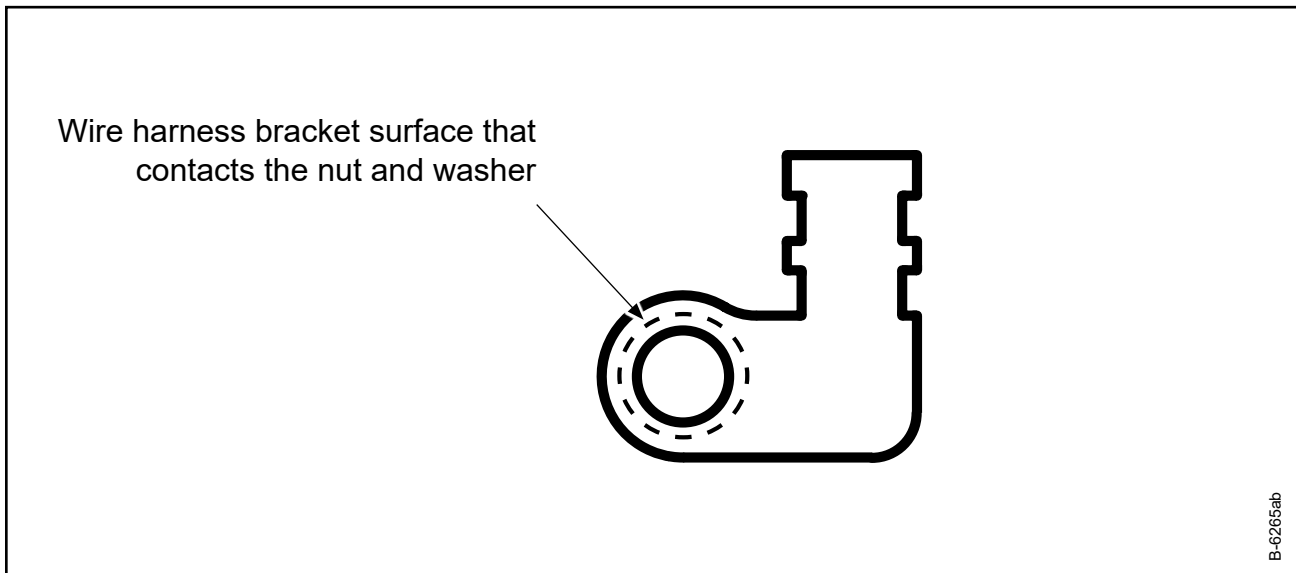
**Alodine Coating Inspection: 106335 Brush Block Bracket Only  
Figure 5-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

**De-ice System Component Inspection Criteria**

<b>Inspect</b>	<b>Serviceable Limits</b>	<b>Corrective Action</b>
<b>J. <u>WIRE HARNESS BRACKETS</u></b>		
(1) Visually examine the wire harness bracket for corrosion product and pitting.	Corrosion product is not permitted. If there is corrosion product, remove it in accordance with the corrective action repair limits.  The maximum permitted depth of pitting is 0.007 inch (0.17 mm).	Remove corrosion product using glass bead cleaning in accordance with the Cleaning chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02). If the corrosion product cannot be removed or if the pitting is greater than the permitted serviceable limits, replace the wire harness bracket.
(2) Visually examine the wire harness bracket for cracks.	A crack is not permitted.	If there is a crack, replace the wire harness bracket.
(3) Visually examine the wire harness bracket surface that touches the nut and washer for damage. Refer to Figure 5-3.	Individual radial impressions caused by the nut and washer are permitted. Circumferential gouging that removes material is not permitted.	If the damage is greater than the permitted serviceable limits, replace the wire harness bracket.

**De-ice System Component Inspection Criteria  
Table 5-2, page 10 of 15**



**Wire Harness Bracket Inspection  
Figure 5-3**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

**De-ice System Component Inspection Criteria**

Inspect	Serviceable Limits	Corrective Action
<b>J. <u>WIRE HARNESS BRACKETS, continued</u></b>		
<p>(4) This check only applies to wire harness brackets: B-6265(L) Rev. N and earlier - and - 105558(L) Rev. D and earlier.</p> <p>Visually examine the wire harness bracket for cadmium plating coverage.</p>	<p>A maximum of 10% of visible base metal is permitted.</p>	<p>If cadmium plate coverage is less than the permitted serviceable limits, cadmium replating the wire harness bracket in accordance with the Cadmium Replating chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).</p>
<b>K. <u>AMMETER</u></b>		
<p>(1) Check that the ammeter and shunt are correctly matched by checking the shunt notation. Shunts with "30 amps = 50 MV" are used with 0-30 amp range ammeters. Shunts with "50 amps = 50 MV" are used with 0-50 amp range ammeters.</p>	<p>Check shunt by disconnecting ammeter leads and connecting a millivoltmeter across the shunt. Activate the de-icing system and check the millivoltmeter reading. If the ammeter scale is 0-50, the millivoltmeter reading should be the same as the ammeter reading. If the ammeter scale is 0-30, the millivoltmeter reading should be 1-2/3 (167%) of the ammeter reading. Check the ammeter by connecting a test shunt of proper value or using an adjustable 0-50 millivolt source. Check for correct reading with the deicing system activated. If the readings from the ammeter and shunt do not agree, replace whichever is defective.</p>	<p>If the readings from the ammeter and shunt do not agree, replace whichever is defective.</p>

**De-ice System Component Inspection Criteria  
Table 5-2, page 11 of 15**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

**De-ice System Component Inspection Criteria**

<b>Inspect</b>	<b>Serviceable Limits</b>	<b>Corrective Action</b>
<b>L. <u>MOV MODULE ASSEMBLY</u></b>		
(1) Visually examine for damage and loose or missing hardware.	Minor damage, such as, nicks and scratches, is permitted. Loose or missing hardware or tubing is not permitted.	Replace any damaged or missing hardware or tubing.  Tighten any loose hardware and safety as required.
(2) Inspect for arcing damage caused by a short or lightning surging.	Arcing damage is not permitted. A short circuit is not permitted.	If there is evidence of arcing, replace or return the unit to Hartzell for inspection or replacement. If lightning damage is suspected, perform additional propeller or airframe inspection in accordance with Hartzell Standard Practices Manual 202A (61-01-02) or the TC holder's ICA.
<b>M. <u>MOV BRACKET</u></b>		
(1) Visually examine for general appearance.	Obvious damage that could adversely affect proper function is not permitted.	If damage exceeds serviceable limits, replace the MOV bracket.
(2) Visually examine for cracks.	A crack is not permitted.	If there is a crack, replace the MOV bracket.
(3) Visually examine for corrosion and pitting.	Corrosion is not permitted. Pitting larger than 0.062 inch (1.575 mm) diameter and 0.010 inch (0.254 mm) deep is not permitted.	Remove active corrosion using glass media. Refer to the Cleaning chapter of Hartzell Standard Practices Manual 202A (61-01-02). If damage is more than the permitted serviceable limits, replace the MOV bracket.  If pitting is greater than the serviceable limits, replace the MOV bracket.

**De-ice System Component Inspection Criteria  
Table 5-2, page 12 of 15**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

**De-ice System Component Inspection Criteria**

<b>Inspect</b>	<b>Serviceable Limits</b>	<b>Corrective Action</b>
<b>N. <u>TIMER</u></b>		
(1) Visually examine for general appearance.	Obvious damage that could adversely affect proper function is not permitted.	If damage exceeds serviceable limits, contact Hartzell Propeller Product Support.
(2) Visually examine for a crack.	A crack is not permitted.	If there is a crack, contact Hartzell Propeller Product Support.
(3) Visually examine for corrosion and pitting.	Corrosion is not permitted. Pitting in excess of 0.062 inch (1.575 mm) diameter and 0.010 inch (0.254 mm) deep is not permitted.	If pitting exceeds serviceable limits, contact Hartzell Propeller Product Support. Use glass media to remove corrosion.
<b>O. <u>CIRCUIT BREAKER</u></b>		
(1) Visually examine for general appearance.	Obvious damage that could adversely affect proper function is not permitted.	If damage exceeds serviceable limits, replace the circuit breaker switch.
(2) Visually examine for cracks.	A crack is not permitted.	If there is a crack, replace the circuit breaker switch.
<b>P. <u>TERMINAL STRIP SPACER</u></b>		
(1) Visually examine for general appearance.	Obvious damage that could adversely affect proper function is not permitted. Using CM128 and a soft bristle brush to remove contaminants.	If damage exceeds serviceable limits, replace the terminal strip spacer.
(2) Visually examine for cracks or arcing damage.	A crack or arcing damage is not permitted.	If there is a crack or arcing damage, replace the terminal strip spacer.

**De-ice System Component Inspection Criteria  
Table 5-2, page 13 of 15**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

**De-ice System Component Inspection Criteria**

<b>Inspect</b>	<b>Serviceable Limits</b>	<b>Corrective Action</b>
<b>Q. <u>LEAD STRAP CLIP</u></b>		
(1) Visually examine for general appearance.	Obvious damage that could adversely affect proper function is not permitted.	If damage exceeds serviceable limits, replace the lead strap clip.
(2) Visually examine for cracks.	A crack is not permitted.	If there is a crack, replace the lead strap clip.
<b>R. <u>TERMINAL CLAMP ASSEMBLY</u></b>		
(1) Visually examine for general appearance.	Obvious damage that could adversely affect proper function is not permitted.	If damage exceeds serviceable limits, replace the terminal clamp assembly.
(2) Visually examine for cracks.	A crack is not permitted.	If there is a crack, replace the terminal clamp assembly.
(3) Visually examine for corrosion.	Pitting in excess of 0.062 inch (1.575 mm) diameter and 0.010 inch (0.254 mm) deep is not permitted.	If pitting exceeds serviceable limits, replace the terminal clamp assembly.
	Active corrosion is not permitted.	Using glass media blasting, remove active corrosion.
(4) Inspect for loose studs.	Obvious damage that could adversely affect proper function is not permitted.	If a stud is loose, replace the terminal clamp assembly.

**De-ice System Component Inspection Criteria  
Table 5-2, page 14 of 15**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

**De-ice System Component Inspection Criteria**

<b>Inspect</b>	<b>Serviceable Limits</b>	<b>Corrective Action</b>
<b>S. <u>INSULATING BUSHING</u></b>		
(1) Visually examine for general appearance.	Obvious damage that could adversely affect proper function is not permitted.	If damage exceeds serviceable limits, replace the insulating bushing.
(2) Visually examine for cracks.	A crack is not permitted.	If there is a crack, replace the insulating bushing.
<b>T. <u>SYNCHROPHASER TARGET</u></b>		
(1) Visually examine for general appearance.	Obvious damage that could adversely affect proper function is not permitted.	If damage exceeds serviceable limits, replace the part.
<b>U. <u>RUBBER SPACER, WIRE HARNESS</u></b>		
(1) Visually examine for general appearance.	Obvious damage that could adversely affect proper function is not permitted.	If damage exceeds serviceable limits, replace the part.
<b>V. <u>DE-ICE SYSTEM CHECK</u></b>		
(1) Perform the "De-ice System Operational Check: Without Engine Power" in accordance with the instructions in this chapter.		
(2) Perform the "De-ice System Operational Check: Rotating" in accordance with the instructions in this chapter.		
(3) Perform the "De-ice Boot Circuit Resistance Inspection" in accordance with the instructions in this chapter.		

**De-ice System Component Inspection Criteria  
Table 5-2, page 15 of 15**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

4. Anti-ice System Inspection Schedules/Procedures

A. 200-Hour Inspection

- (1) At 200 flight hour intervals, not to exceed 12 calendar months, perform an inspection of the anti-ice system in accordance with Table 5-3 in this chapter.
  - (a) The inspection/maintenance schedule specified by the airframe manufacturer and approved by the applicable airworthiness agency may not coincide with the inspection interval specified in this manual. The airframe manufacturer's schedule may be used but the calendar limit for the inspection interval cannot exceed 12 calendar months.
- (2) Perform additional inspections in accordance with the aircraft TC or STC holder's Instructions for Continued Airworthiness (ICA).

B. At Propeller Overhaul:

- (1) Inspect the components of the anti-ice system in accordance with Table 5-4 in this chapter.
  - (a) For overhaul periods of Hartzell propellers, refer to Hartzell Propeller Service Letter HC-SL-61-61Y.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

**Anti-ice System 200-Hour Inspection**

<b>Inspect</b>	<b>Serviceable Limits</b>	<b>Corrective Action</b>
<b>A. <u>ANTI-ICE BOOTS</u></b>		
(1) Visually examine the anti-icing boot for impact damage or deterioration.	Damage that impairs the flow of the fluid is not permitted.	If damage exceeds serviceable limits, replace the anti-icing boot.
(2) Visually examine the anti-icing boot for debonding.	Refer to the section, "De-ice/Anti-ice Boot Debond Limits" in this chapter.	Refer to the section, "De-ice/Anti-ice Boot Debond Limits" in this chapter.
(3) Visually examine the area around the anti-icing boot for blade corrosion or exposed metal, especially corrosion that extends beneath the anti-icing boots.	Corrosion and/or exposed metal is not permitted.	If there is corrosion or exposed metal, the anti-icing boot must be removed and the corrosion repaired by qualified personnel at an appropriately licensed propeller repair facility.
<b>B. <u>SLINGER RING ASSEMBLY (Steel)</u></b>		
(1) Visually examine the slinger ring assembly for cracks.	A crack is not permitted.	If there is a crack, replace the slinger ring assembly.
(2) Visually examine the welds for cracks or separation.	A crack or separation is not permitted.	If there is a crack or separation, replace the slinger ring assembly.
(3) Visually examine the slinger ring assembly for damage.	Obvious damage that could adversely affect proper function is not permitted.	If damage exceeds serviceable limits, replace the slinger ring assembly.

**Anti-ice System 200-Hour Inspection  
Table 5-3, page 1 of 3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

**Anti-ice System 200-Hour Inspection**

Inspect	Serviceable Limits	Corrective Action
B1. <u>SLINGER RING ASSEMBLY (Aluminum)</u>		
(1) Visually examine the slinger ring assembly for cracks.	A crack is not permitted.	If there is a crack, replace the slinger ring assembly. For a slinger ring that is bonded to the spinner bulkhead, replace the slinger ring in accordance with the Repair/Modification chapter in this manual.
(2) Visually examine the slinger ring assembly for damage.	Obvious damage that could adversely affect proper function is not permitted.	If damage exceeds serviceable limits, replace the slinger ring assembly. For a slinger ring that is bonded to the spinner bulkhead, replace the slinger ring in accordance with the Repair/Modification chapter in this manual.
(3) For a slinger ring that is bonded to the spinner bulkhead: Visually examine the slinger ring/spinner bulkhead for debonding.	Debonding is not permitted.	If there is debonding, remove the slinger ring from the spinner bulkhead, then re-install in accordance with the applicable section in the Repair/Modification chapter in this manual.

**Anti-ice System 200-Hour Inspection  
Table 5-3, page 2 of 3**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

**Anti-ice System 200-Hour Inspection**

Inspect	Serviceable Limits	Corrective Action
<b>C. <u>HARDWARE (including Hub Clamping Bolts included in anti-ice kits)</u></b>		
(1) Visually examine all hardware components for corrosion.	Corrosion is not permitted.	If there is corrosion, replace the affected hardware component(s).
(2) Visually examine all hardware components for damage.	Minor nicks and scratches are permitted.	If the damage is greater than the permitted serviceable limit, replace the affected hardware component(s).
	Damage that affects the fit and/or function of the hardware component is not permitted.	
(3) Visually examine for loose and/or missing hardware.	Loose/missing hardware is not permitted.	Tighten any loose hardware component(s).  Replace any missing hardware component(s).
(4) Visually examine to make sure the safety wire and hose clamps are secure.	Safety wire and hose clamps must securely attach the travel tube and travel tube hoses.	Re-safety or tighten as necessary.
<b>D. <u>AIRCRAFT FEED TUBE (to Slinger Ring)</u></b>		
(1) Visually examine the aircraft feed tube and the propeller hub for indications of interference.	Interference between the aircraft feed tube and the propeller hub is not permitted.	If there is interference, adjust the aircraft feed tube in accordance with the airframe manufacturer's, or TC/STC holder's instructions.
<b>F. <u>ANTI-ICE SYSTEM COMPONENTS (except the Slinger Ring Assembly)</u></b>		
(1) Inspect the anti-ice system components in accordance with Table 5-4 in this chapter.		
<b>E. <u>ANTI-ICE SYSTEM CHECK</u></b>		
(1) Perform the "Anti-ice System Operational Check" in accordance with the instructions in this chapter.		

**Anti-ice System 200-Hour Inspection  
Table 5-3, page 3 of 3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

**Anti-ice System Component Inspection Criteria**

Inspect	Serviceable Limits	Corrective Action
<b>A. <u>SLINGER RING ASSEMBLY (Steel)</u></b>		
ATTENTION: This complete inspection is only required at overhaul.		
(1) Visually examine the slinger ring assembly for cracks.	A crack is not permitted.	If there is a crack, replace the slinger ring assembly.
(2) Visually examine the welds for cracks or separation.	A crack or separation is not permitted.	If there is a crack or separation, replace the slinger ring assembly.
(3) Visually examine the slinger ring assembly for damage.	Obvious damage that could adversely affect proper function is not permitted.	If damage exceeds serviceable limits, replace the slinger ring assembly.
(4) Visually examine the cadmium plating for coverage, if applicable.	Minor wear on corners and random light scratches are permitted; otherwise, complete coverage is required.	If the coverage is less than the permitted serviceable limits, cadmium replate the slinger ring assembly in accordance with the Cadmium Re-Plating chapter of the Hartzell Propeller Standard Practices Manual 202A (61-01-02).
(5) Magnetic particle inspect the slinger ring assembly in accordance with the Magnetic Particle Inspection chapter of Hartzell Standard Practices Manual 202A (61-01-02). Cadmium plating does not need to be removed.	A relevant indication is not permitted.	If there is a relevant indication, replace the slinger ring assembly.

**Anti-ice System Component Inspection Criteria**  
**Table 5-4, page 1 of 6**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

**Anti-ice System Component Inspection Criteria**

Inspect	Serviceable Limits	Corrective Action
A1. <u>SLINGER RING ASSEMBLY (Aluminum)</u>		
ATTENTION: This complete inspection is only required at overhaul.		
CAUTION: DO <u>NOT</u> REMOVE THE FITTINGS FROM THE 107636 SLINGER RING UNLESS SPECIFIED IN THIS TABLE.		
(1) Visually examine the slinger ring assembly for cracks.	A crack is not permitted.	If there is a crack, replace the slinger ring assembly. For a slinger ring that is bonded to the spinner bulkhead, replace the slinger ring in accordance with the Repair/Modification chapter in this manual.
(2) Visually examine the slinger ring assembly for damage.	Obvious damage that could adversely affect proper function is not permitted.	If damage exceeds serviceable limits, replace the slinger ring assembly. For a slinger ring that is bonded to the spinner bulkhead, replace the slinger ring in accordance with the Repair/Modification chapter in this manual.
(3) For slinger ring p/n 7931-13025-06: Visually examine the anodize coating for coverage.	Minor wear on corners and random light scratches are permitted; otherwise, complete coverage is required.	If the coverage is less than the permitted serviceable limits, alodine the slinger ring assembly in accordance with the Chromic Acid Anodizing chapter of the Hartzell Propeller Standard Practices Manual 202A (61-01-02).

**Anti-ice System Component Inspection Criteria  
Table 5-4, page 2 of 6**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

**Anti-ice System Component Inspection Criteria**

Inspect	Serviceable Limits	Corrective Action
A1. <u>SLINGER RING ASSEMBLY (Aluminum), continued</u>		
(4) For a slinger ring that <u>is</u> bonded to the spinner bulkhead: Visually examine the spinner bulkhead and the slinger ring for corrosion, pitting, and debonding.	Corrosion is not permitted.  The maximum permitted depth of pitting is 0.003 inch (0.08 mm).  The maximum permitted depth of pitting within a total accumulated area of 10% of the bulkhead surface is 0.005 inch (0.012 mm).  The maximum permitted diameter of pitting is 0.063 inch (1.60 mm).  Debonding is not permitted.	Using an abrasive pad such as CM47, lightly polish. If plating is removed, alodine the slinger ring assembly in accordance with the Chromic Acid Anodizing chapter of the Hartzell Propeller Standard Practices Manual 202A (61-01-02).  If the corrosion or pitting is greater than the permitted serviceable limits, replace the spinner bulkhead in accordance with Hartzell Propeller Metal Spinner Maintenance Manual 127 (61-16-27) or replace the slinger ring in accordance with the Repair/Modification chapter in this manual.  If there is debonding, remove the slinger ring from the spinner bulkhead, then re-install in accordance with the applicable section in the Repair/Modification chapter in this manual.
	(5) For slinger ring p/n 107636 (w/fittings installed): Visually examine the zinc plating on the fittings installed in the slinger ring for coverage.	Minor wear on corners and random light scratches are permitted; otherwise, complete coverage is required.  If the coverage is less than the permitted serviceable limits remove the fittings, then penetrant inspect the slinger ring in accordance step (7) in this table.

**Anti-ice System Component Inspection Criteria  
Table 5-4, page 3 of 6**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

**Anti-ice System Component Inspection Criteria**

Inspect	Serviceable Limits	Corrective Action
(6) For a slinger ring that is <u>not</u> bonded to a spinner bulkhead - <b>except</b> p/n 107636 (w/fittings installed): Penetrant inspect the slinger ring assembly in accordance with the Penetrant Inspection chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).	A relevant indication is not permitted.	If there is a relevant indication, replace the slinger ring assembly.  For slinger ring p/n 107636 with the fittings removed: Fitting installation is a factory-only repair. Contact Hartzell Propeller Product Support.

**B. SLINGER RING HARDWARE**

(1) Visually examine the slinger ring hardware for corrosion, pitting, and damage.	Corrosion is not permitted. Pitting or damage that adversely affects the fit or function of the hardware component is not permitted.	If there is corrosion, pitting, or damage that exceeds the permitted serviceable limits, replace the applicable hardware component.
--	--	---

**C. BOLT, 3/8, HEX HEAD (Hub Clamping Bolt)**

- (1) At overhaul only:  
Hub clamping bolts that are included with anti-ice kits must be inspected in accordance with the hub clamping bolt inspection criteria in the applicable Hartzell Propeller propeller overhaul/maintenance manual.

**D. SPACER**

(1) Visually examine for general appearance.	Obvious damage that could adversely affect proper function is not permitted.	If damage exceeds serviceable limits, replace the spacer.
(2) Visually examine for cracks.	A crack is not permitted.	If there is a crack, replace the spacer.

**Anti-ice System Component Inspection Criteria  
Table 5-4, page 4 of 6**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

**Anti-ice System Component Inspection Criteria**

<b>Inspect</b>	<b>Serviceable Limits</b>	<b>Corrective Action</b>
<b>E. <u>TRAVEL TUBES/HOSES</u></b>		
(1) Examine all travel tubes and travel tube hoses for obstructions.	Obstructions are not permitted.	Remove any obstructions.
(2) Visually examine all travel tubes and travel tube hoses for cracks.	Cracks are not permitted.	If there is a crack, replace the travel tube/travel tube hose.
(3) Visually examine to make sure the safety wire and hose clamps are secure.	Safety wire and hose clamps must securely attach the travel tube and travel tube hose.	Re-safety or tighten as needed.
(4) Visually examine the travel tubes and spinner dome for indications of interference.	Interference between the travel tubes/spinner dome is not permitted.	If there is interference, adjust the travel tubes in accordance with the applicable anti-ice kit installation instructions in this manual.

**Anti-ice System Component Inspection Criteria  
Table 5-4, page 5 of 6**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

**Anti-ice System Component Inspection Criteria**

<b>Inspect</b>	<b>Serviceable Limits</b>	<b>Corrective Action</b>
<b>F. <u>ANTI-ICE BRACKET</u></b>		
(1) Visually examine each bracket for bending, cracking, or distortion.	Bending, cracking, or distortion is not permitted.	If there is bending, cracking, or distortion, replace the anti-ice bracket.
(2) Visually examine each anti-ice bracket for corrosion, pitting, and damage.	Corrosion is not permitted. If there is corrosion, remove it in accordance with the corrective action repair limits. Pitting or damage that adversely affects the fit or function of the bracket is not permitted.	Use an abrasive pad CM47 or equivalent to remove corrosion. If corrosion cannot be removed, or if pitting or damage adversely affects the fit or function of the bracket, replace the anti-ice bracket.
(3) Visually examine each anti-ice bracket for a loose rivet.	A loose rivet is not permitted.	If there is a loose rivet, replace the rivet. Refer to the section, "Replacement of Rivets" in the Repair and Modification chapter of this manual.
(4) <u>At overhaul only:</u> Perform penetrant inspection in accordance with the Penetrant Inspection chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).	A relevant indication is not permitted.	If there is a relevant indication, replace the anti-ice bracket.
<b>G. <u>ANTI-ICE SYSTEM CHECK</u></b>		
(1) Perform the "Anti-ice System Operational Check" in accordance with the instructions in this chapter.		

**Anti-ice System Component Inspection Criteria**  
**Table 5-4, page 6 of 6**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

5. Special Inspections: De-ice Systems

A. Lightning Strike

- (1) In the event of a propeller lightning strike, the de-ice system must be inspected in accordance with Table 5-5 before further flight.

B. Sudden Stoppage

- (1) If the propeller experiences a sudden stoppage, perform the "200-Hour Inspection" in accordance with Table 5-1 in this chapter before further flight.

<b>Lightning Strike Inspection: De-ice Systems</b> Required Before Further Flight
A. <u>MOV MODULE ASSEMBLY (if applicable)</u> (1) Replace the MOV Module Assembly in accordance with the applicable de-ice kit installation instructions.
B. <u>DE-ICE BOOTS</u> (1) Perform the "De-ice Boot Circuit Resistance Inspection" in accordance with the instructions in this chapter.  (2) For graphite composite blades: Perform the "Dielectric Strength Check" in accordance with the instructions in this chapter.
C. <u>STEEL DE-ICE PARTS (ALL)</u> (1) Check all steel parts for magnetism in accordance with the section, "Demagnetization" in Hartzell Propeller Standard Practices Manual 202A (61-01-02).
D. <u>SLIP RING ASSEMBLY</u> (1) Perform the "Slip Ring Assembly Insulation Resistance Check" in accordance with the instructions in this chapter.
E. <u>TIMER</u> (1) Perform the "Timer Test" in accordance with the instructions in this chapter.
F. <u>200-Hour Inspection</u> (1) Perform the "200-Hour Inspection" in accordance with Table 5-1 in this chapter.














**Lightning Strike Inspection: De-ice Systems**  
**Table 5-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

**Fire Inspection: De-ice Systems**  
Required Before Further Flight

**A. DE-ICE BOOTS**

- (1) Perform the "De-ice Boot Circuit Resistance Inspection" in accordance with the instructions in this chapter.
- (2) For graphite composite blades:  
Perform the "Dielectric Strength Check" in accordance with the instructions in this chapter.

**B. SLIP RING ASSEMBLY**

- (1) Perform the "Slip Ring Assembly Insulation Resistance Check" in accordance with the instructions in this chapter.

**C. TIMER**

- (1) Perform the "Timer Test" in accordance with the instructions in this chapter.

**D. 200-Hour Inspection**

- (1) Perform the "200-Hour Inspection" in accordance with Table 5-1 in this chapter.

**Fire Inspection: De-ice Systems**  
**Table 5-6**

**Foreign Object/Ground Strike: De-ice Systems**  
Required Before Further Flight

**A. DE-ICE BOOTS**

- (1) Perform the "De-ice Boot Circuit Resistance Inspection" in accordance with the instructions in this chapter.

**B. SLIP RING ASSEMBLY**

- (1) Perform the "Slip Ring Assembly Insulation Resistance Check" in accordance with the instructions in this chapter.

**C. 200-Hour Inspection**

- (1) Perform the "200-Hour Inspection" in accordance with Table 5-1 in this chapter.

**Foreign Object/Ground Strike: De-ice Systems**  
**Table 5-7**

C. Fire

- (1) If the propeller is exposed to fire or extreme heat, the de-ice system must be inspected in accordance with Table 5-6 before further flight.

D. Foreign Object/Ground Strike

- (1) If the propeller experiences a foreign object/ground strike, the de-ice system must be inspected in accordance with Table 5-7 before further flight.

6. Special Inspections: Anti-ice Systems

A. Lightning Strike

- (1) In the event of a propeller lightning strike, perform the "200-Hour Inspection" in accordance with Table 5-3 in this chapter before further flight.

B. Sudden Stoppage

- (1) If the propeller experiences a sudden stoppage, perform the "200-Hour Inspection" in accordance with Table 5-3 in this chapter before further flight.

C. Fire

- (1) If the propeller is exposed to fire or extreme heat, perform the "200-Hour Inspection" in accordance with Table 5-3 in this chapter before further flight.

D. Foreign Object/Ground Strike

- (1) If the propeller experiences a foreign object/ground strike, perform the "200-Hour Inspection" in accordance with Table 5-3 in this chapter before further flight.

## 7. De-ice Operational Checks

### A. Without Engine Power

**CAUTION:** TO PREVENT ARCING DAMAGE TO THE SLIP RING WHEN PERFORMING THE PROPELLER DE-ICE OPERATIONAL CHECK (WITHOUT ENGINE POWER), SLOWLY ROTATE THE PROPELLER BY HAND.

**NOTE:** An auxiliary power supply (APU) may be used when checking the de-ice system.

#### (1) De-ice System Indicator Test

(a) On a multi-engine application only, isolate the de-ice system on the non-test propeller.

1 Using a non-conductive material, isolate the brushes to keep the brushes from touching the slip ring.

(b) Slowly rotate the test propeller by hand.

**CAUTION 1:** FOR AN ALUMINUM BLADE: DO NOT OPERATE THE DE-ICE BOOTS FOR MORE THAN ONE CYCLE. OVERHEATING OF THE DE-ICE BOOT CAN CAUSE DAMAGE TO THE PROPELLER BLADES. PERMIT BLADES TO COOL COMPLETELY BEFORE REPEATING THE TEST.

**CAUTION 2:** FOR A COMPOSITE BLADE: DO NOT OPERATE THE DE-ICE BOOTS FOR MORE THAN 30 SECONDS. OVERHEATING OF THE DE-ICE BOOT CAN CAUSE DAMAGE TO THE PROPELLER BLADES. PERMIT BLADES TO COOL COMPLETELY BEFORE REPEATING THE TEST.

(c) Activate the de-ice system in accordance with the aircraft TC or STC holder's Instructions for Continued Airworthiness (ICA).

(d) Make sure that the ammeter(s) or annunciator(s) indication for the test propeller is within acceptable limits for each phase.

1 If the indication is not within acceptable limits, refer to the section, "De-ice Boot Circuit Resistance Inspection" in this chapter.

2 If the indication is not within acceptable limits and the De-ice Boot Circuit Resistance Inspection has no fault found, refer to the aircraft TC or STC holder's Instructions for Continued Airworthiness (ICA).

(e) If applicable, repeat the test for the other propeller assemblies.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

(2) De-ice Boot Heat Test:

- (a) Slowly rotate the test propeller by hand.

CAUTION 1: FOR AN ALUMINUM BLADE: DO NOT OPERATE THE DE-ICE BOOTS FOR MORE THAN ONE CYCLE. OVERHEATING THE DE-ICE BOOT CAN CAUSE DAMAGE TO THE PROPELLER BLADES. PERMIT BLADES TO COOL COMPLETELY BEFORE REPEATING THE TEST.

CAUTION 2: FOR A COMPOSITE BLADE: DO NOT OPERATE THE DE-ICE BOOTS FOR MORE THAN 30 SECONDS. OVERHEATING THE DE-ICE BOOT CAN CAUSE DAMAGE TO THE PROPELLER BLADES. PERMIT BLADES TO COOL COMPLETELY BEFORE REPEATING THE TEST.

- (b) Activate the de-ice system in accordance with the aircraft TC or STC holder's Instructions for Continued Airworthiness (ICA).

WARNING: THE DE-ICE SYSTEMS ON SOME AIRCRAFT OPERATE AT 200 VAC WHICH CAN CAUSE SERIOUS OR FATAL INJURY. USE EXTREME CAUTION WHEN OPERATING THE PROPELLER DE-ICE SYSTEM WHILE THE AIRCRAFT IS STATIC. VISUALLY EXAMINE THE DE-ICE BOOTS FOR CRACKS OR EXPOSED HEATING ELEMENTS.

- (c) Touch the de-ice boot area on each blade that should be heated during each phase of the de-ice cycle.

- 1 Hartzell Propeller de-ice systems will have one of the following cycling patterns:
  - a All outboard areas will heat at the same time, and then all inboard areas will heat at the same time.
  - b All boots will heat at the same time, and are off at the same time.
  - c On some four bladed propellers, blades 1 and 3 will heat, and then blades 2 and 4.
- 2 Refer to the aircraft service documents (AMM, aircraft TC, and/or the STC holder's ICA) for the applicable cycling pattern.
- 3 If the heating is not correct, refer to the applicable de-ice kit installation instructions in this manual, or the aircraft TC or STC holder's Instructions for Continued Airworthiness to make sure that the propeller de-ice wiring is correct.

B. With Engine Power (Rotating)

- (1) Lock the brakes and operate the engine at a high RPM setting.
- (2) Activate the de-ice system in accordance with the aircraft TC or STC holder's ICA and monitor the ammeter or annunciator for approximately two cycles for the appropriate installation.
- (3) Make sure that the ammeter(s) or annunciator(s) indication remains within the acceptable limits for the complete phase of each cycle.

NOTE: Some ammeter needles may flicker outside the shaded area as the timer cycles to each phase.

- (a) If the indication is not within the acceptable limits, go to the section, "De-ice Boot Circuit Resistance Inspection" in this chapter.

- (4) Repeat steps (1) through (3) of this procedure as needed.

8. Anti-ice Operational Check

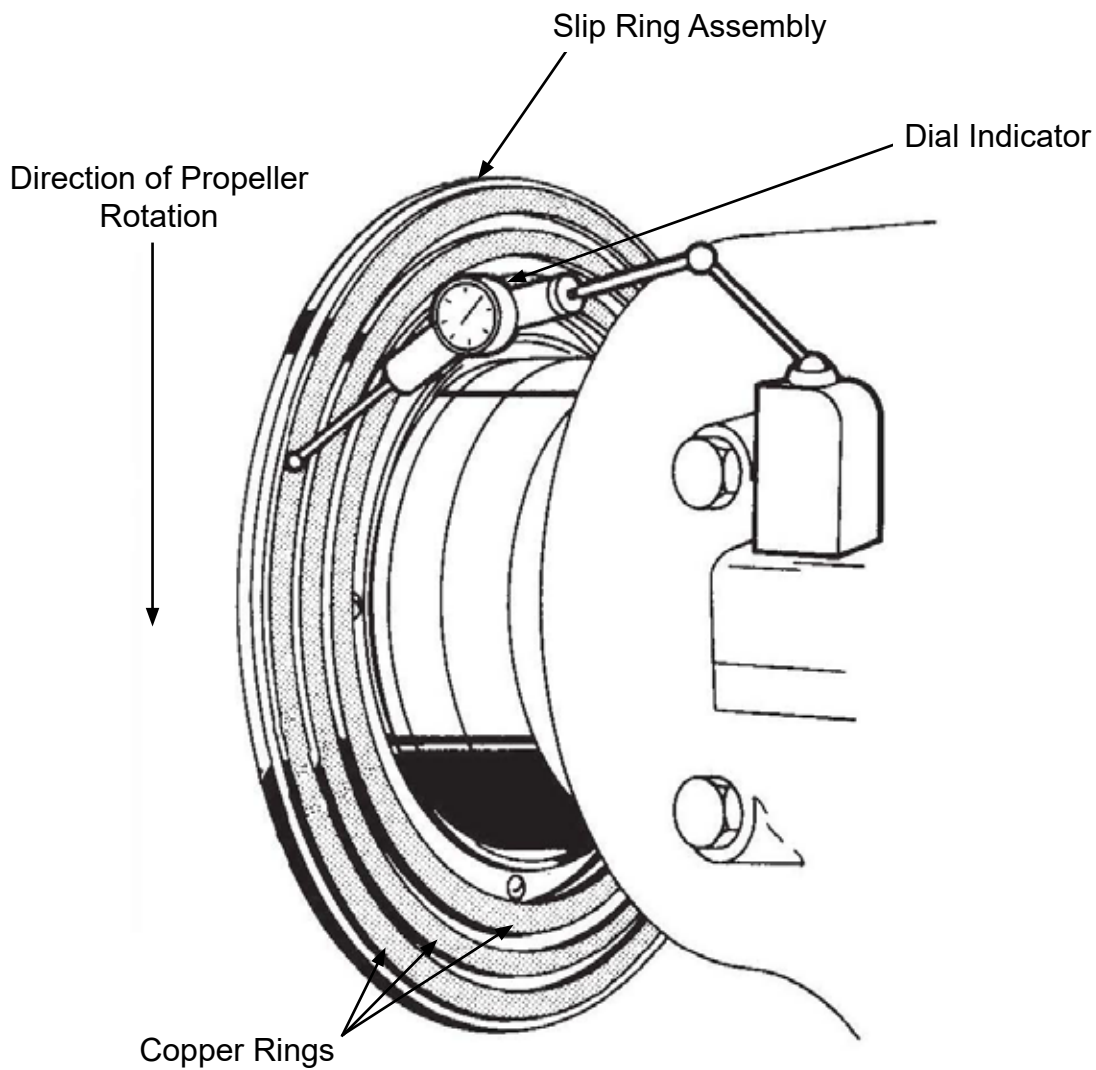
A. Procedure

- (1) Attach a hose to the tubing between the pump and the slinger ring. Place the other end of the hose in a container that is marked for measuring fluid.
- (2) Refer to the aircraft TC or STC holder's ICA or the propeller owner's manual for anti-ice system flow rate information. For example, the owners manual may state that "with the rheostat in the MAX position, fluid is dispensed at a rate of approximately one quart every four minutes."
- (3) Operate the system as suggested in the aircraft TC or STC holder's ICA or propeller owner's manual. The container that is marked for measuring fluid should contain the amount of anti-ice fluid specified by the aircraft TC or STC holder's ICA or propeller owner's manual at the end of the test.
- (4) If the expected results are not achieved at the conclusion of the test:
  - (a) No fluid flow to all blades on all propellers (if applicable).
    - 1 The tank is empty.
    - 2 The tank siphon tube is blocked. Clean the tube and reinstall.
    - 3 The filter is clogged. Clean or replace the filter and reinstall.
    - 4 The pump is inoperative. Loosen the output fitting at the pump and the operating system and measure the fluid flow at the pump. Replace the pump if necessary.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

- (b) No fluid flow to one propeller (all blades).
  - 1 The tank is empty.
  - 2 The tank siphon tube is blocked. Clean the tube and reinstall.
  - 3 The filter is clogged. Clean or replace the filter and reinstall.
  - 4 The pump is inoperative. Loosen the output fitting at the pump and the operating system and measure the fluid flow at the pump. Replace the pump if necessary.
  - 5 The check valve is clogged or stuck closed. Remove the obstruction or replace the valve as necessary.
  - 6 The travel tube to the slinger ring is clogged. Remove the obstruction.
- (c) No fluid flow to one or more blades.
  - 1 Clogged slinger ring tube(s). Remove the obstruction.
- (d) Fluid supply decreases - system not in use.
  - 1 There is evaporation. Alcohol systems are especially prone to fluid loss through evaporation.
  - 2 There is a system leak. Check the tank and lines for leaks. Repair or replace components as necessary.
  - 3 There is a marked fluid loss after flight. There is a defective check valve. Replace the check valve as necessary.
- (e) Flow rate slows or stops as system is operated.
  - 1 The tank vent is blocked or inoperative. Clear the blockage or replace the vent as necessary.

HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180



TP-RUN\_OUT\_SLIP\_RING

Slip Ring Run-out Check  
Figure 5-4



## 9. Slip Ring Inspections

### A. Slip Ring Run-out Check

**CAUTION:** SEVERE ARCING AND BRUSH WEAR OFTEN OCCUR WHEN THERE IS "WOBBLE" IN THE SLIP RING ASSEMBLY (1140). WOBBLE OCCURS BECAUSE THE SLIP RINGS DO NOT RUN IN A PLANE PERPENDICULAR TO THE CENTER LINE OF ROTATION OF THE PROPELLER SHAFT. SLIP RING WOBBLE WILL CAUSE RAPID DETERIORATION OF THE SLIP RING/BRUSH BLOCK CONTACT SURFACES AND EVENTUAL FAILURE OF THE DE-ICE SYSTEM.

- (1) Perform slip ring run-out check at each slip ring installation, whenever brush block assembly is replaced, or as needed to troubleshoot a suspected system fault.
- (2) Perform a slip ring assembly (1140) run-out check:
  - (a) Attach a dial indicator gauge to the engine or assembly stand.
  - (b) Hold the propeller blade and rotate the propeller slowly.
  - (c) Place the pointer on the copper ring. Refer to Figure 5-4.
  - (d) Measure the slip ring indicated run-out.
- (3) Use uniform push or pull on the propeller to make sure the slip ring run-out measurement is accurate.
- (4) The maximum permitted total indicated run-out (TIR) is 0.005 inch (0.127 mm) for piston engines, or 0.008 inch (0.2032 mm) for turbine engines. Total indicated run-out (TIR) measurement must not exceed 0.0020 inch (0.0508 mm) within any 4.0 inch (101.5 mm) arc of slip ring travel.

**CAUTION:** DO NOT VARY THE TORQUE OF THE PROPELLER ATTACHMENT BOLTS. VARY THE TORQUE ONLY ON THE SLIP RING MOUNTING BOLTS.

- (a) For steel hub and compact propeller installed using a belleville washer, the belleville washer arrangement that permits proper slip ring adjustment by varying the torque applied to attaching hardware.

- 1 If the slip ring run-out measurement exceeds serviceable limits, vary the torque on the slip ring attachment bolts within the limits specified below or in accordance with the TC or STC holder's ICA, or within standard limits for bolts used.

a 96 - 120 in-lbs. (10.8 - 13.5 N•m) for 1/4-28 bolts or screws

b 21 - 32 in-lbs. (2.3 - 3.6 N•m) for 10-32 screws or bolts

c 40 - 120 in-lbs. (4.5 - 13.5 N•m) if Belleville washers are used

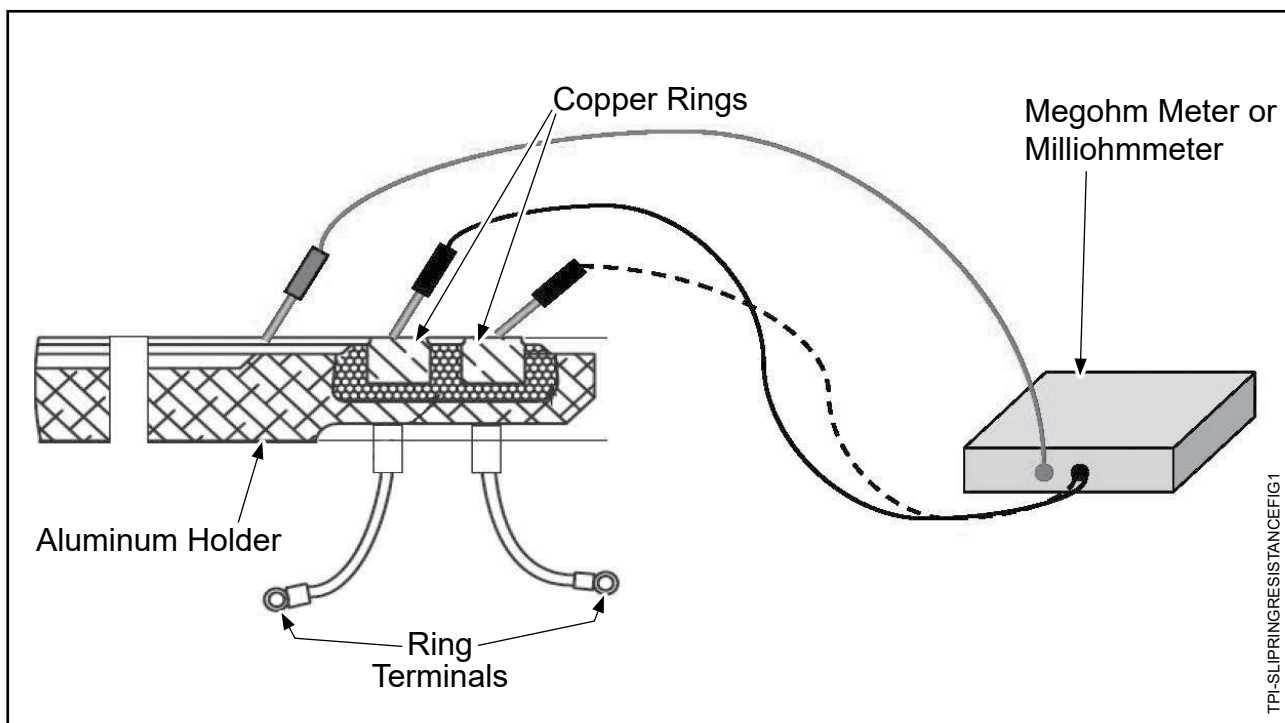
**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

- (b) If the run-out still exceeds serviceable limits:
- 1 Remove the slip ring assembly (1140) and clean.
  - 2 Make sure of the flatness and structural integrity of the mounting surface.
  - 3 Put the slip ring assembly on a flat surface and measure the slip ring run-out (flatness to mounting surface).
  - 4 If necessary, resurface the slip ring in accordance with the De-Ice Slip Ring Resurfacing section in the Repair/Modification chapter of this manual.
  - 5 Reinstall the slip ring assembly (1140) on the propeller.
  - 6 Perform the slip ring run-out check.
  - 7 If the run-out still exceeds serviceable limits, replace the slip ring assembly (1140) with a serviceable part.

B. Slip Ring Assembly Insulation Resistance Checks

**WARNING 1:** 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.

- (1) Using CM128 or CM106, thoroughly clean the copper rings.
- (2) Set the milliohmmmeter TE355 on an appropriate scale to measure 0.20 ohms.
  - (a) Refer to the manufacturer's instructions for zeroing and meter setup.
- (3) Measure the resistance from each copper slip ring to each other. Refer to Figure 5-5.
  - (a) Resistance must read open circuit or infinite.
  - (b) Repeat for each copper ring in the assembly.
- (4) Measure the resistance from each copper slip ring to the aluminum holder. Refer to Figure 5-5.
  - (a) Resistance must read open circuit or infinite.
  - (b) Repeat for each copper ring in the assembly.



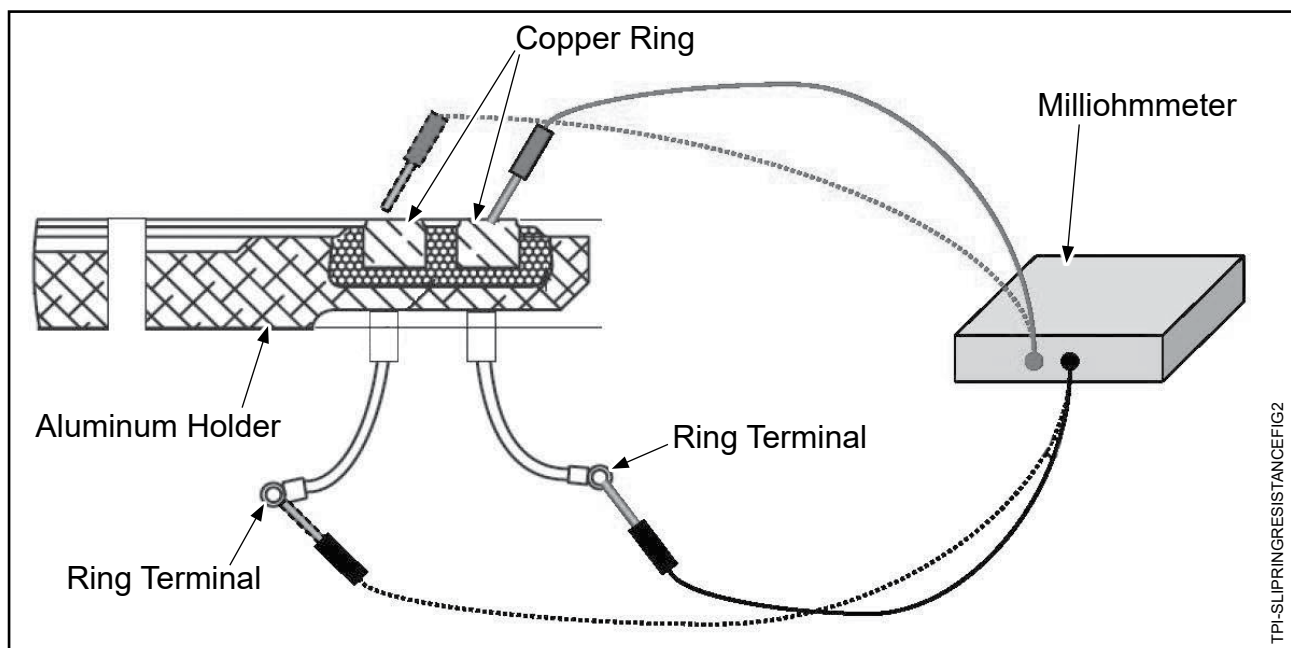
**Slip Ring Resistance Check: Copper Ring to Aluminum Holder**  
**Figure 5-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

- (5) Measure the resistance from each copper slip ring and the applicable ring terminal. Refer to Figure 5-6.
  - (a) Resistance must read  $<0.20$  ohms.
  - (b) Repeat for each copper ring in the assembly.
- (6) If the slip ring resistance check is not within limits, replace the slip ring assembly.

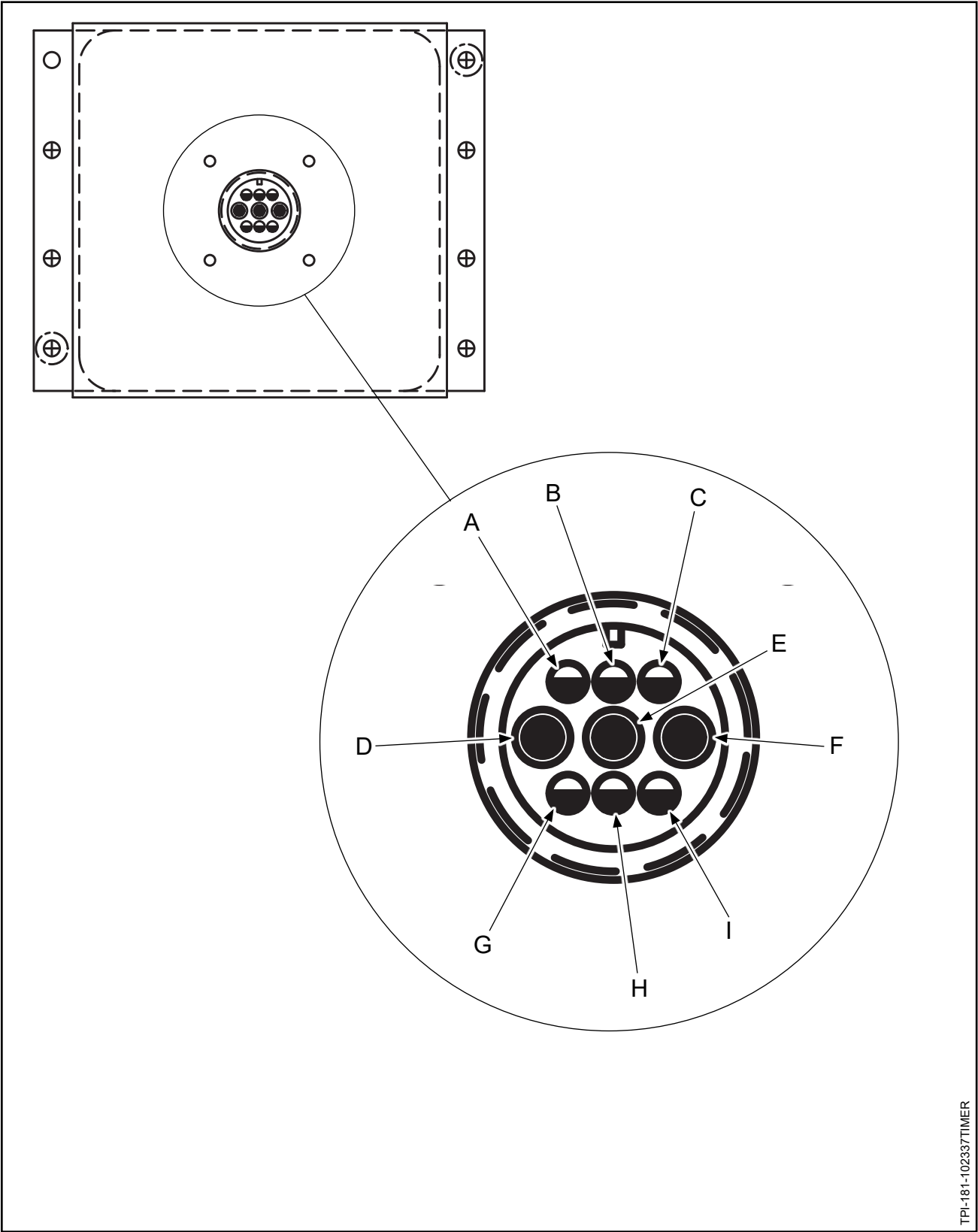
**WARNING:** THE FOLLOWING TEST REQUIRES THE USE OF A MEGOHM METER UTILIZING HIGH VOLTAGE POTENTIAL. USE EXTREME CAUTION AND FOLLOW MANUFACTURER'S RECOMMENDED SAFETY PROCEDURES. TESTING MUST BE PERFORMED BY QUALIFIED PERSONNEL FAMILIAR WITH THE USE OF ELECTRICAL TEST EQUIPMENT.

- (7) Put the assembly on a non-conductive surface.
- (8) Using a megohm meter TE354, measure the insulation resistance.
- (9) Apply 500 VDC. The insulation resistance must be a minimum of 5 megohms after 30 seconds.
- (10) Measure the insulation resistance from each copper ring to the aluminum holder. Refer to Figure 5-5.
  - (a) Repeat for each copper ring in the assembly.
- (11) If this check is not within limits, replace the slip ring assembly.



**Slip Ring Resistance Check Ring to Terminal Ring  
Figure 5-6**

HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180



TP1-181-102337TIMER

1( ) ( ) ( ) ( ) Timers: Pin Location  
Figure 5-7

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

**10. Timer Tests**

**A. Hartzell p/n 1( )( )( ) Timers Only**

**CAUTION 1:** FOR AN ALUMINUM BLADE: DO NOT OPERATE THE DE-ICE BOOTS FOR MORE THAN ONE CYCLE. OVERHEATING THE DE-ICE BOOT CAN CAUSE DAMAGE TO THE PROPELLER BLADES. PERMIT BLADES TO COOL COMPLETELY BEFORE REPEATING THE TEST.

**CAUTION 2:** FOR A COMPOSITE BLADE: DO NOT OPERATE THE DE-ICE BOOTS FOR MORE THAN 30 SECONDS. OVERHEATING THE DE-ICE BOOT CAN CAUSE DAMAGE TO THE PROPELLER BLADES. PERMIT BLADES TO COOL COMPLETELY BEFORE REPEATING THE TEST.

**NOTE:** The timer test is required only when the de-ice boot heat test or abnormal current annunciation shows a system malfunction.

- (1) The test pins on the timer that are used will depend on the installation. Refer to the Aircraft Maintenance Manual for applicable test pins. Perform the Timer Test as required using the applicable pins. Refer to Figure 5-7.
- (2) Use an APU with 24 to 32 VDC output or a system battery capable of supplying 40 amps DC at 24 volts minimum.
- (3) Turn the system On.
- (4) Measure voltage from aircraft ground to Pin E.
  - (a) Voltage of 24 volts minimum should be present.
- (5) If applicable, switch the timer on to slow mode.
  - (a) Measure from aircraft ground to output Pin D.
    - 1 Output should have a system voltage for 90 seconds each +/-5% alternating between outputs (Pin D and Pin F). Refer to Table 5-8.

SLOW MODE CYCLE		
Pin	90 SECONDS	90 SECONDS
D	ON	OFF
F	OFF	ON

**Timer: Slow Mode Cycle  
Table 5-8**

FAST MODE CYCLE			
PIN	45 SECONDS	45 SECONDS	90 SECONDS
D	ON	OFF	DWELL (OFF)
F	OFF	ON	DWELL (OFF)

**Timer: Fast Mode Cycle  
Table 5-9**

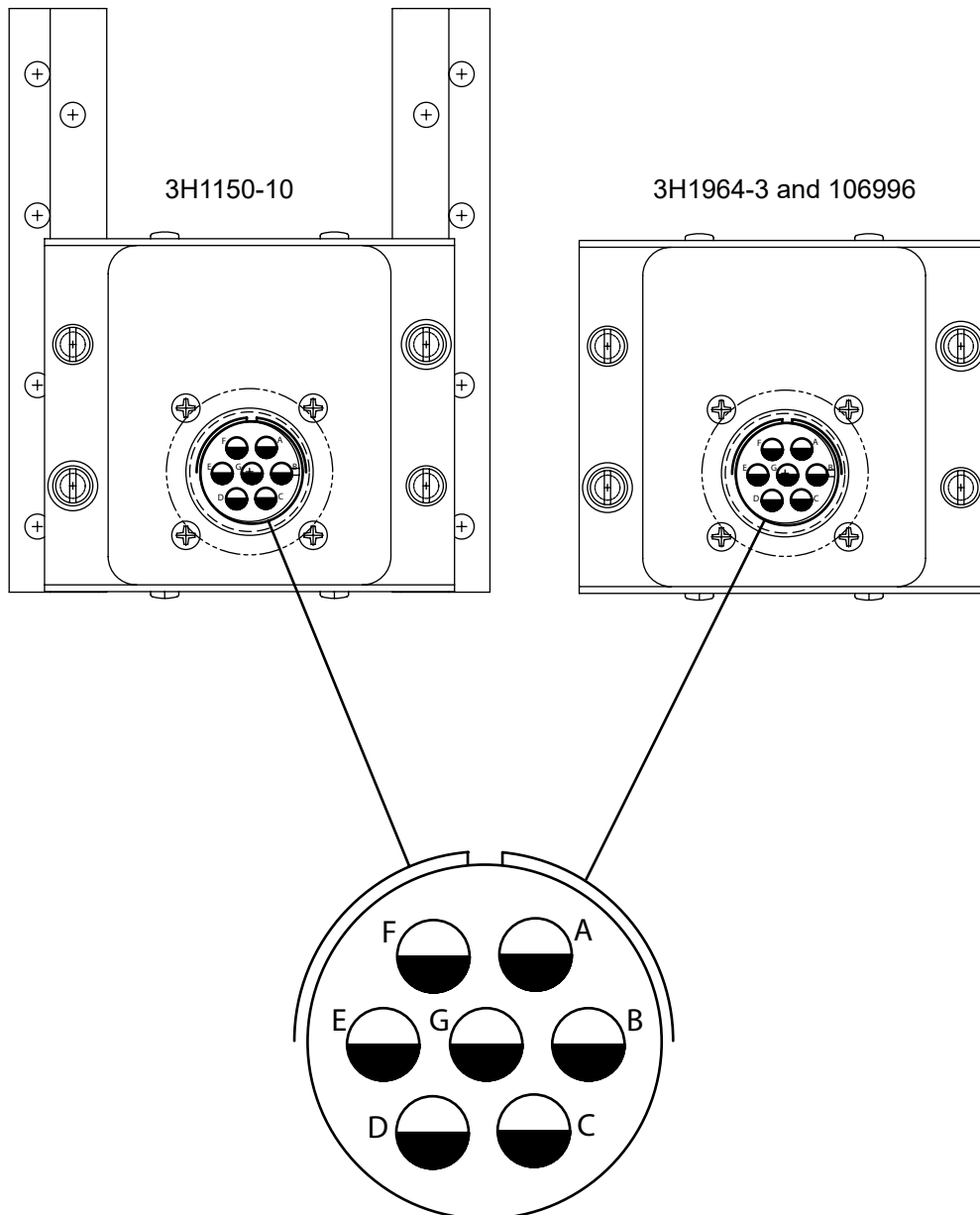
**HARTZELL ICE PROTECTION SYSTEM  
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- (b) Measure from aircraft ground to output Pin F.
- 1 Output should have a system voltage for 90 seconds each +/-5% alternating between outputs (Pin D and Pin F). Refer to Table 5-8.
- (6) If applicable, switch the timer on to fast mode.
- NOTE: When measuring output from Pin D or Pin F, there may be a delay of up to 135 seconds before voltage can be measured.
- (a) Measure from aircraft ground to output Pin D.
- 1 Output should have a system voltage for 45 seconds ON and OFF for 135 seconds each +/-5% alternating between outputs (Pin D and Pin F). Refer to Table 5-9.
- (b) Measure from aircraft ground to output Pin F.
- 1 Output should have a system voltage for 45 seconds ON and OFF for 135 seconds each +/-5% alternating between outputs (Pin D and Pin F). Refer to Table 5-9.
- (7) Mode Switch Check
- (a) If applicable, measure from the aircraft ground to Pin B.
- 1 28 volts should be present for Slow Mode.
- (b) If applicable, measure from the aircraft ground to Pin C.
- 1 28 volts should be present for Fast Mode.
- (8) Measure resistance from aircraft ground to output Pin "H".
- (a) Continuity (0 ohms) should be present when the Actual System Current is in the Actual System Current voltage range. Refer to Table 5-10.
- (9) Measure Annunciator Output Voltage Pin G (positive) and Pin I (negative).
- (a) Voltage should be present for Actual System Current. Refer to Table 5-10.
- (10) If the readings are not within the limits specified in Table 5-8, Table 5-9, and Table 5-10, contact Hartzell Propeller Product Support.

ANNUNCIATOR OUTPUT VOLTAGE		ACTUAL SYSTEM CURRENT RANGE
TIMER PART NUMBER	VOLTAGE (Pin G Positive +, Pin I is Negative -	
102337	3.4 - 4.2	34 - 42
103402	2.2 - 2.7	22 - 27

**Actual System Current to Voltage Output  
Table 5-10**

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3H1150-10, 3H1964-3, and 106996 Timers: Pin Location  
Figure 5-8



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**B. Hartzell p/n 3H1150-10, 3H1964-3, and 106996 Timers Only**

**CAUTION 1:** FOR AN ALUMINUM BLADE: DO NOT OPERATE THE DE-ICE BOOTS FOR MORE THAN ONE CYCLE. OVERHEATING THE DE-ICE BOOT CAN CAUSE DAMAGE TO THE PROPELLER BLADES. PERMIT BLADES TO COOL COMPLETELY BEFORE REPEATING THE TEST.

**CAUTION 2:** FOR A COMPOSITE BLADE: DO NOT OPERATE THE DE-ICE BOOTS FOR MORE THAN 30 SECONDS. OVERHEATING THE DE-ICE BOOT CAN CAUSE DAMAGE TO THE PROPELLER BLADES. PERMIT BLADES TO COOL COMPLETELY BEFORE REPEATING THE TEST.

**NOTE:** The timer test is required only when the de-ice boot heat test or abnormal current annunciation shows a system malfunction.

- (1) The test pins on the timer that are used will depend on the installation. Refer to the Aircraft Maintenance Manual or Maintenance Manual Supplement for applicable test pins. Perform the Timer Test as required using the applicable pins. Refer to Figure 5-8.
- (2) Determine the aircraft system voltage (14 or 28 volts).
  - (a) Check the system voltage ground jumper for continuity.
    - 1 Pin A - Continuity to ground for 14 volt systems
    - 2 Pin G - Continuity to ground for 28 volt systems
- (3) **For 14 Volt Systems:** Use an auxiliary power unit (APU) with 11 to 16 volt output, or a system battery capable of supplying 34 amps DC at 12 volts minimum.
- (4) **For 28 Volt Systems:** Use an auxiliary power unit (APU) with 22 to 32 VDC output, or a system battery capable of supplying 34 amps DC at 24 volts minimum.
- (5) Turn the system ON.
- (6) Measure the voltage from aircraft ground to Pin B.
  - (a) **For 14 Volt Systems:** Minimum of 12 volts should be present.
  - (b) **For 28 Volt Systems:** Minimum of 24 volts should be present.

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**CAUTION:** FOR COMPOSITE PROPELLERS, ISOLATE THE PROPELLER SYSTEM AND USE A 180 OHM 10 WATT OR GREATER WATTAGE RESISTOR ACROSS EACH OUTPUT CIRCUIT FOR THE FOLLOWING TIMING CHECKS.

- (7) Timer outputs must have propeller de-ice system or a resistive load of 1.5 to 180 ohms present for the following timing checks.
- (a) For 3H1150-10 and 106996 Timers Only - Refer to Table 5-11
- 1 Measure from aircraft ground to output Pin C.
    - a Output should have a system voltage for 34 seconds each  $\pm 5\%$  stepping through outputs (Pins C, D, E, and F).
  - 2 Measure from aircraft ground to output Pin D.
    - a Output should have a system voltage for 34 seconds each  $\pm 5\%$  stepping through outputs (Pins C, D, E, and F).
  - 3 Measure from aircraft ground to output Pin E.
    - a Output should have a system voltage for 34 seconds each  $\pm 5\%$  stepping through outputs (Pins C, D, E, and F).
  - 4 Measure from aircraft ground to output Pin F.
    - a Output should have a system voltage for 34 seconds each  $\pm 5\%$  stepping through outputs (Pins C, D, E, and F).
  - 5 If the readings are not within the limits specified in Table 5-11, contact Hartzell Propeller Product Support.

OUTPUT CYCLE $\pm 5\%$				
PIN	34 SECONDS	34 SECONDS	34 SECONDS	34 SECONDS
C	ON	OFF	OFF	OFF
D	OFF	ON	OFF	OFF
E	OFF	OFF	ON	OFF
F	OFF	OFF	OFF	ON

**3H1150-10 and 106996 Timers: Output Cycle  
Table 5-11**

OUTPUT CYCLE $\pm 5\%$		
PIN	90 SECONDS	90 SECONDS
D	OFF	ON
F	OFF	OFF

**3H1964-3 Timers: Output Cycle  
Table 5-12**

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- (b) For 3H1964-3 Timers Only - Refer to Table 5-12
- 1 Measure from aircraft ground to output Pin D.
    - a Output should have a system voltage for 90 seconds each  $\pm 5\%$  stepping through outputs (Pins D and F).
  - 2 Measure from aircraft ground to output Pin F.
    - a Output should have a system voltage for 90 seconds each  $\pm 5\%$  stepping through outputs (Pins D and F).
  - 3 If the readings are not within the limits specified in Table 5-12, contact Hartzell Propeller Product Support.

**11. De-ice/Anti-ice Boot Inspections**

**A. De-ice/Anti-ice Boot Debond Limits**

- (1) For the 4H3064-1 and the 7931-4E3064-1 de-ice boot installed on the HC-B5MA-2( ) propeller:
  - (a) The maximum allowable debond is 6.50 square inches (4193.54 square mm) over the entire de-ice boot surface, face side and camber side combined.
  - (b) If debond exceeds the allowable limit, the de-ice boot must be replaced.
- (2) For the B-6442 de-ice boot installed on the HD-E6C-3( ) propeller:
  - (a) The maximum permitted debond is 30.00 square inches (19354 sq/mm) over the entire de-ice boot surface, face side, and camber side combined.
  - (b) If debond exceeds the permitted limit, the de-ice boot must be replaced at the next A-check or within 300 flight hours, whichever occurs first.
  - (c) A de-ice boot with debonded areas that exceed 35.0 square inches (22580 sq/mm) must be replaced before further flight, except as noted below.
    - 1 If visual inspection shows no evidence of premature de-ice boot failure, the de-ice boot may remain in service for up to 10 flight hours, to permit maintenance scheduling.
  - (d) A debond may not extend to the edge of the de-ice boot.
    - 1 Loose de-ice boot edges at the outboard end of the de-ice boot, within 0.25 inch (6.35 mm) of the leading edge, are permitted.
- (3) For the 4H4072-(1, 2) and the 7931-4E4072-(1, 2) de-ice boot installed on the HC-E5A-2( ) propeller:
  - (a) The maximum permitted area of debond is 9.0 sq-in. (5806 sq-mm) over the entire de-ice boot surface, face and camber side combined.
  - (b) If debond exceeds the allowable limit, the de-ice boot must be replaced.

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- (4) For all other de-ice boots or anti-icing boots:
  - (a) The maximum permitted area of debond is 3.0 sq-in. (1935 sq-mm) over the entire de-ice boot surface, face side and camber side combined.
  - (b) If debond exceeds the permitted limit, the de-ice boot must be replaced.
- (5) For all de-ice boots or anti-icing boots:
  - (a) A raised area of a debond must not have signs of accelerated erosion, tearing, punctures, or other unusual wear or damage that could lead to premature failure of the de-ice boot.
  - (b) A de-ice boot or an anti-icing boot that has significantly raised areas of debond that would obviously affect the function must be replaced before further flight.
- (6) Re-adhering de-ice boot or anti-icing boot debond:
  - (a) Re-adhere de-ice boot or anti-icing boot in accordance with the applicable chapter in this manual:
    - 1    Anti-icing Boot Removal/Installation chapter
    - 2    De-ice Boot Removal/Installation chapter

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**B. De-ice Boot Inspection for Overheating or a Short Circuit**

**CAUTION:** DO NOT OPERATE THE DE-ICE BOOTS ON AN ALUMINUM BLADE FOR MORE THAN ONE CYCLE WHEN THE AMBIENT TEMPERATURE IS ABOVE 100°F (38°C). OVERHEATING OF THE DE-ICE BOOT CAN CAUSE DAMAGE TO THE PROPELLER BLADES. ALLOW BLADES TO COOL COMPLETELY BEFORE REPEATING THE TEST.

**(1) For an aluminum blade:**

- (a)** If the de-ice boot indicates evidence of damage, burning, or short circuits, or has experienced or is suspected of overheating because of operation in a non-rotating environment, inspect the de-ice boot for a debond condition in accordance with the section, "De-ice Boot and Anti-icing Boot Debond Limits" in this chapter.

**1** If the debond is greater than the limits permitted:

- a** Remove and replace the de-ice boot in accordance with the De-ice Boot Removal/Installation chapter of this manual.
- b** Inspect the blade in the area where the de-ice boot is installed in accordance with the Check chapter of Hartzell Propeller Aluminum Blade Overhaul Manual 133C (61-13-33).
- c** Contact the Hartzell Propeller Product Support department if the blade exhibits arcing damage or evidence of overheating.

**2** If a debond condition is not found, the propeller may be returned to service.

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**CAUTION:** FOR A COMPOSITE BLADE: DO NOT OPERATE THE DE-ICE BOOTS FOR MORE THAN 30 SECONDS. OVERHEATING OF THE DE-ICE BOOT CAN CAUSE DAMAGE TO THE PROPELLER BLADES. PERMIT BLADES TO COOL COMPLETELY BEFORE REPEATING THE TEST.

(2) For a composite blade:

(a) If the de-ice boot has experienced or is suspected of overheating because of operation in a non-rotating environment, inspect the de-ice boot for a debond condition in accordance with the section, "De-ice Boot and Anti-icing Boot Debond Limits" in this chapter.

1 If the debond is greater than the limits permitted:

a Remove and replace the de-ice boot in accordance with the De-ice Boot Removal/Installation chapter in this manual.

b Perform a visual and a coin tap inspection of the blade in the area where the de-ice boot is installed in accordance with the Check chapter of Hartzell Propeller Composite Blade Overhaul Manual 135F (61-13-35).

c Contact the Hartzell Propeller Product Support department if a blade exhibits arching damage or evidence of overheating.

2 If a debond condition is not found, the propeller may be returned to service.

**C. De-ice Boot Circuit Resistance Inspection**

**NOTE:** A de-ice boot circuit includes the de-ice boot, de-ice wire harness, de-ice terminal strips, slip ring wire harness, and all other components that permit the de-ice system to work.

(1) Isolate the slip ring assembly from the brush block brushes.

(a) Isolate the brushes from the slip ring assembly using a non-conductive material to prevent contact by a brush to the slip ring.

(2) Using a megohm meter, with the 2000 megohm at 500 volts (DC) range selected, attach it to any point on the de-ice circuit and to a hub clamping bolt.

(3) Dielectric Reading Inspection

(a) If the dielectric reading is less than 8 megohms, remove grease, oil, or other contaminants from the slip ring surface or other connection parts that could lead to a faulty reading and repeat the resistance check.

(b) If the dielectric reading remains less than 8 megohms, isolate each component and perform resistance check until the fault is found. Clean, replace, or repair the affected component(s).

(c) A dielectric reading greater than 8 megohms is acceptable.

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- (4) Perform the following electrical resistance inspection on each blade in the propeller assembly:
  - (a) Disconnect the de-ice boot circuit for each blade at the closest connection to the slip ring assembly to isolate the de-ice boot circuit for each blade.
  - (b) Using a standard ohmmeter, measure the resistance and compare the results to the applicable resistance values listed in the section, "Resistance Values" in the De-ice Boot Removal/Installation chapter of this manual.
  - (c) Flex and probe each component on the de-ice boot circuit while monitoring the resistance readings.
    - 1 If the resistance reading fluctuates, clean, repair, or replace any affected component.
    - 2 Read the resistance of the de-ice boot circuit and compare the results to the resistance values specified in the "Resistance Values" section in the De-ice Boot Removal/Installation chapter of this manual.
      - a If the resistance value is not correct, isolate the de-ice boot and perform resistance check on the boot.
      - b If the resistance value of the de-ice boot reading is not correct, replace the de-ice boot in accordance with the De-ice Boot Removal/Installation chapter of this manual.
      - c If the resistance value of the de-ice boot reading is correct, isolate each component and perform resistance check until the fault is found. Clean, Replace, repair the affected component(s).
- (5) When the resistance value of the de-ice circuit is correct, repeat the inspection specified in the section, "Propeller De-ice Operational Check: Without Engine Power" in this chapter.

D. Dielectric Strength Check (De-ice Boots)

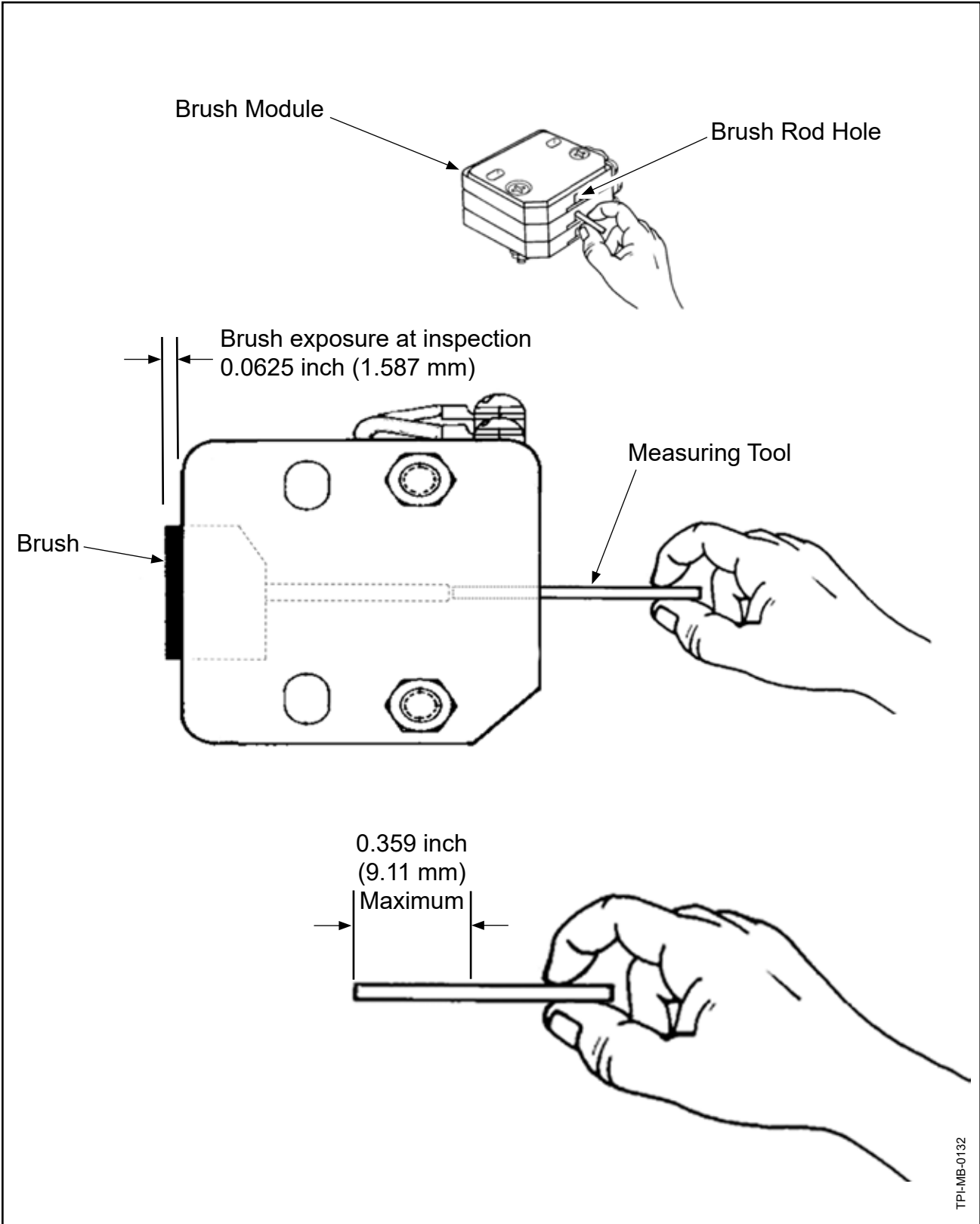
**CAUTION:** DO NOT ATTEMPT THIS TEST UNLESS ALL REATTACHMENT PROCEDURES ARE COMPLETE, INCLUDING TOTAL CURING OF THE ADHESIVE.

- (1) Using an Associated Research Meg-Check, Model 2026D, or Model 1026, or equivalent, with the 2000 megohm at 500 volts (DC) range selected, check the dielectric strength of each de-ice boot on the propeller assembly.
  - (a) Disconnect the de-ice lead wires to isolate the individual de-ice boot. Connect the positive (red) lead of the test unit to a lead wire on one blade de-ice boot.
  - (b) Connect the negative (black) lead to an exposed section of the erosion shield.

**WARNING:** DO NOT TOUCH ANY PART OF THE BLADE WHILE THE FOLLOWING TEST EQUIPMENT IS TURNED ON.

- (c) Turn the power switch to the "ON" position for one minute while observing the resistance reading. The resistance measurement must be 8 Megohm or more.
  - (d) If the resistance is less than 8 Megohm, the de-ice boot must be replaced.
- (2) If resistance is greater than or less than the serviceable limits specified in the "Resistance Values" section in the De-ice Boot Removal/Installation chapter of this manual.





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**Brush Measurement**  
**Figure 5-9**

## 12. Modular Brush Block Assembly Inspections

### A. Brush Measurement

#### (1) Brush Modules with Rods

##### (a) Measure brush wear to determine requirement to replace brushes.

- 1 Refer to Figure 5-9 how to measure brush wear. Compress brush into the module so that 0.0625 inch (1.587 mm) of the brush extends from the brush module.
- 2 Use a toothpick, small diameter wire, or equivalent as a measuring tool. Slide the measuring tool into the brush rod hole in the module until the tool touches the end of the rod.
- 3 Mark or indicate on the measuring tool the location where it aligns with the outside edge of the module.
- 4 Remove the measuring tool from the module and measure the amount of the measuring tool that extended into the module.
- 5 When the measured amount is 0.359 inch (9.118 mm) or greater, replace the brush.

- (2) Replace the brush as necessary in accordance with the Repair/Modification chapter of this manual.

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**WARNING 1:** DO NOT ATTEMPT IN THE FIELD ANY REPAIR, REPLACEMENT, REWORK, REPLATING, OR RE-ANODIZING NOT SPECIFICALLY AUTHORIZED BY HARTZELL PROPELLER LLC OR SPECIFIED IN A HARTZELL PROPELLER MANUAL. CONTACT HARTZELL PROPELLER LLC FOR GUIDANCE ABOUT THE AIRWORTHINESS OF ANY PART WITH UNUSUAL WEAR OR DAMAGE.

**WARNING 2:** ADHESIVES AND SOLVENTS ARE FLAMMABLE AND TOXIC TO THE SKIN, EYES, AND RESPIRATORY TRACT. SKIN AND EYE PROTECTION ARE REQUIRED. AVOID PROLONGED CONTACT AND BREATHING OF VAPORS. USE SOLVENT RESISTANT GLOVES TO MINIMIZE SKIN CONTACT AND WEAR SAFETY GLASSES FOR EYE PROTECTION. USE IN A WELL VENTILATED AREA AWAY FROM SPARKS AND FLAME. READ AND OBSERVE ALL WARNING LABELS.

**CAUTION 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.

#### 1. General Repair Requirements

##### A. Aluminum and Steel Parts

- (1) Eliminate all scratches, nicks, burrs, and other minor damage by using a fine emery cloth or abrasive pad CM47 or equivalent. Make sure to blend the polished area in with the surrounding area. Use extreme care to completely remove the damage while removing as little material as possible.
- (2) Make sure the part is still within serviceable limits after any type of repair. Refer to the Check chapter and the Fits and Clearances chapter of this manual.

##### B. Copper Parts

- (1) Rework and repair copper rings in accordance with the section, "De-ice Slip Ring Resurfacing" in this chapter.

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Part Number	"X" Dimension Refer to Figure 6-1	
	Inches	mm
4H1526-1	0.475	12.06
7931-4E1526-1	0.475	12.06
4H1526-4	0.475	12.06
7931-4E1526-4	0.945	24.00
4H1555-1	0.220	5.58
7931-4E1555-1	0.220	5.58
4H1555-2	0.220	5.58
7931-4E1555-2	0.220	5.58
4H1555-3	0.220	5.58
7931-4E1555-3	0.220	5.58
7931-4E1614-2	0.265	6.73
7931-4E1614-3	0.945	24.00
7931-4E1676-1	0.187	4.74
7931-4E1676-2	0.187	4.74
7931-4E1676-3	0.187	4.74
7931-4E1676-6	0.187	4.74
7931-4E1731-1	1.160	29.46
7931-4E1865-1	0.475	12.06
4H1865-2	0.945	24.00
7931-4E1865-2	0.945	24.00
4H1924-1	0.295	7.49
7931-4E1924-1	0.295	7.49
4H1924-3	0.295	7.49
7931-4E1924-3	0.295	7.49
7931-4E1926-1	0.235	5.96
7931-4E1933-1	0.480	12.19
7931-4E1933-4	0.480	12.19
7931-4E1933-6	0.945	24.00
4H1933-7	0.945	24.00
7931-4E1933-7	0.945	24.00
7931-4E1948-1	0.315	8.00
7931-4E1964-1	0.480	12.19
4H1964-2	0.945	24.00
7931-4E1964-2	0.945	24.00
4H1964-3	0.945	24.00
7931-4E1964-3	0.975	24.76

Part Number	"X" Dimension Refer to Figure 6-1	
	Inches	mm
4H1964-4	0.975	24.76
7931-4E1964-4	0.975	24.76
4H1988-1	0.320	8.13
7931-4E1988-1	0.320	8.13
4H2267-1	0.295	7.49
7931-4E2267-1	0.295	7.49
4H2267-2	0.295	7.49
7931-4E2267-2	0.295	7.49
4H2350-1	0.980	24.89
7931-4E2350-1	0.980	24.89
4H2377-1	0.650	16.51
7931-4E2377-1	0.650	16.51
4H2422	0.295	7.49
7931-4E2422	0.295	7.49
4H2442-1	0.187	4.74
7931-4E2442-1	0.187	4.74
4H2444-1	0.205	5.21
7931-4E2444-1	0.205	5.21
4H2448-1	0.980	24.89
7931-4E2448-1	0.980	24.89
7931-4E2459	0.285	7.23
4H2459-2	0.295	7.49
7931-4E2459-2	0.295	7.49
7931-4E2468	0.310	7.87
4H2511	0.320	8.13
7931-4E2511	0.320	8.13
4H2551-1	0.200	5.08
7931-4E2551-1	0.200	5.08
7931-4E2624-1	0.187	4.74
4H2661-1	0.275	6.98
7931-4E2661-1	0.275	6.98
7931-4E2661-2	0.275	6.98
7931-4E2661-3	0.275	6.98
4H2661-4	0.275	6.98
7931-4E2661-4	0.275	6.98
4H2662-1	0.275	6.98
7931-4E2662-1	0.275	6.98

**Slip Ring Minimum Dimension  
Table 6-1, page 1 of 2**

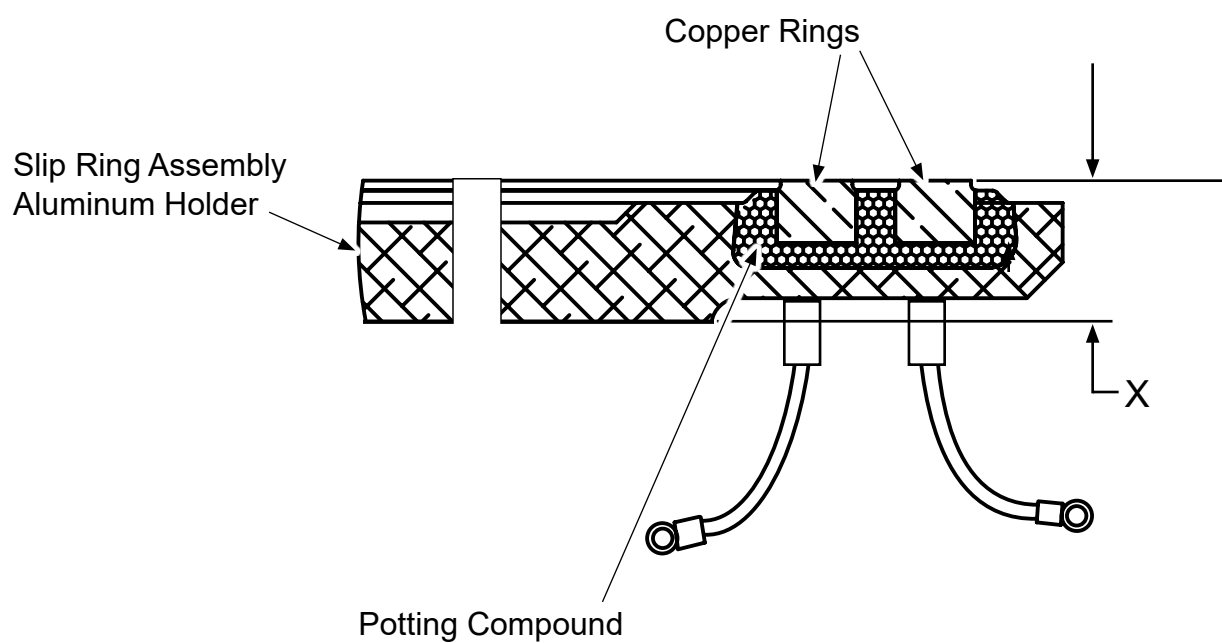
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Part Number	"X" Dimension Refer to Figure 6-1	
	Inches	mm
4H2674-1	0.275	6.98
7931-4E2674-1	0.275	6.98
4H2674-2	0.300	7.62
7931-4E2674-2	0.300	7.62
4H2714-1	0.328	8.33
7931-4E2714-1	0.328	8.33
7931-4E2761-2	0.285	7.23
7931-4E2811-1	See Note	
4H2811-2	See Note	
7931-4E2811-2	See Note	
4H2863	0.714	18.13
7931-4E2863	0.714	18.13
7931-4E2955-1	0.480	12.19
4H3000-1	0.490	12.44
7931-4E3000-1	0.490	12.44
4H3008-1	0.610	15.49
7931-4E3008-1	0.610	15.49
4H3060-1	0.714	18.13
7931-4E3060-1	0.714	18.13
4H3062-1	0.610	15.49
7931-4E3062-1	0.610	15.49
4H3094-1	0.480	12.19
7931-4E3094-1	0.480	12.19
4H3099-1	0.187	4.74
7931-4E3099-1	0.187	4.74
7931-4E3236-1	0.305	7.74
7931-4E3236-2	0.320	8.12
4H3422-1	0.260	6.60
7931-4E3422-1	0.260	6.60
4H4015-1	0.480	12.19
7931-4E4015-1	0.480	12.19
4H4069-1	0.500	12.70
7931-4E4069-1	0.500	12.70
101896	1.420	36.07
104249	0.735	18.67
104472	0.714	18.14
105043	0.275	6.98

Part Number	"X" Dimension Refer to Figure 6-1	
	Inches	mm
105882	0.610	15.49
105925	0.310	7.87
105937	0.432	10.97
106419	0.430	10.92
106556	0.325	8.25
106613	0.295	7.49
106935	0.420	10.67
107042	0.670	17.01
107500	0.600	15.24
107530	0.390	9.90
107533	0.325	8.25
107714	0.370	9.39
107978X	0.670	17.01

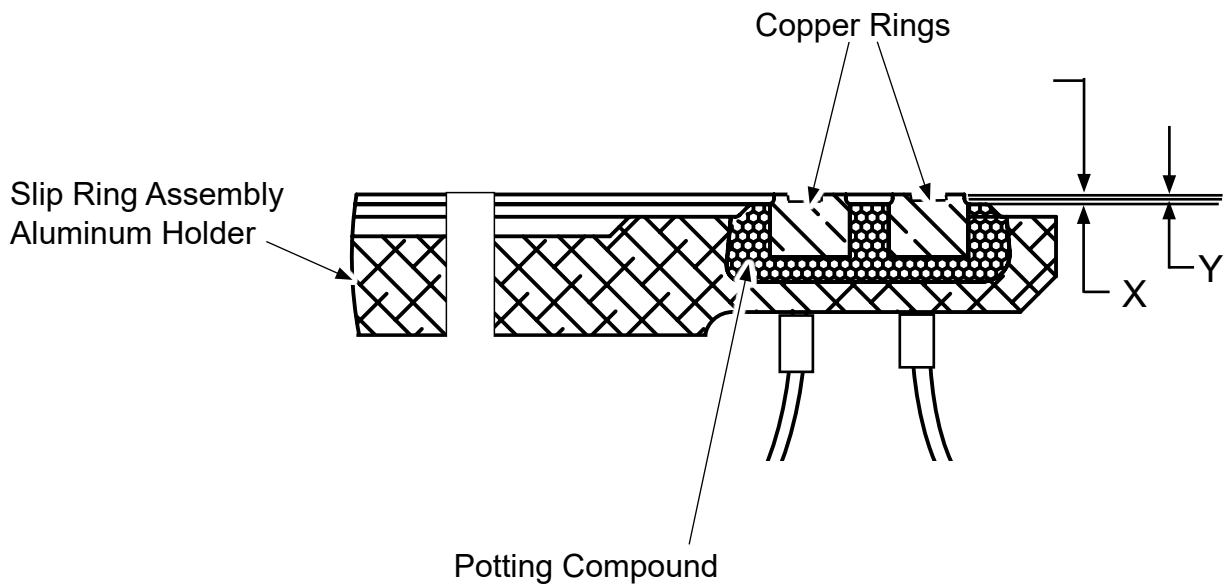
**NOTE:** 4E2811-( ) slip rings are integral to the composite bulkhead D-5313-( ). Machining is permitted up to but not including composite materials. Refer to Figure 6-2.

**Slip Ring Minimum Dimension  
Table 6-1, page 2 of 2**



Slip Ring Minimum Dimension except 4(E,H)2811-( )  
Figure 6-1





**NOTE:** Machining to the surface of the aluminum holder is permitted.

**Slip Ring Minimum Dimension for 4(E,H)2811-( )**  
**Figure 6-2**

## 2. Specific Repair Requirements

### A. De-ice Slip Ring Resurfacing except 4(E,H)2811-( )

- (1) Using solvent CM106 or CM128, clean the slip ring assembly (1140) before machining.
- (2) Install the slip ring assembly (1140) on a lathe.
  - (a) The slip ring assembly (1140) must be centered and installed on a locally manufactured plate. The plate must be sufficiently rigid and flat within 0.002 inch (0.051 mm) or less to prevent deflection of the slip ring assembly (1140) during machining. The plate must permit the slip ring (1140) to be securely mounted to prevent chatter when cutting the surfaces of the copper rings.

**NOTE:** Mounting the slip ring through the slip ring attachment holes provides the best probability of achieving slip ring run out requirements after installation.

- (3) Using a dial indicator, measure the run-out of the inside diameter of the aluminum holder of the slip ring assembly (1140) mounting surface.
  - (a) The holder run-out reading must not exceed 0.0020 inch (0.0508 mm) over 360 degrees of rotation.

**CAUTION:** WHEN MACHINING, DO NOT PERMIT THE TEMPERATURE OF THE SLIP RINGS TO EXCEED 200° F (93°C).

- (4) Set the rotation speed of the lathe at 600-900 RPM. The feed rate should not exceed 0.005 - 0.008 inch (0.13 - 0.20 mm) per revolution.

**CAUTION:** DO NOT MACHINE THE OUTER EDGE OF A SLIP RING HOLDER THAT HAS SYNCHROPHASER TARGETS.

- (5) A diamond edge tool with 0.0156 - 0.0313 inch (0.396 - 0.795 mm) radius is recommended. Alternately, a carbide insert tool with a TIN (Titanium nitride) coated insert with a 0.0156 - 0.0313 inch (0.396 - 0.795 mm) radius may be used.

CAUTION 1: EXCESSIVE HEAT BUILD-UP IN THE COPPER SLIP RINGS CAN RESULT IN DEBONDING OF THE RING FROM THE EPOXY POTTING. A CONTINUOUS APPLICATION OF KEROSENE OR TAPMATIC DUAL ACTION PLUS #2 FLUID IS STRONGLY RECOMMENDED TO AID IN CUTTING, TO PREVENT TOOL CHATTER, AND REDUCE HEAT BUILD-UP. DO NOT USE CUTTING FLUIDS OR COOLANTS OTHER THAN KEROSENE OR TAPMATIC DUAL ACTION PLUS #2 FLUID, AS THEY MAY REACT WITH THE COPPER SLIP RINGS, CAUSING DISCOLORATION AND/OR LEAVING A CONTAMINATING RESIDUE. IF KEROSENE OR TAPMATIC DUAL ACTION PLUS #2 FLUID IS NOT AVAILABLE, MACHINE THE SLIP RING DRY.

CAUTION 2: DO NOT MACHINE THE COPPER SLIP RINGS, INSULATING COMPOUND, OR SLIP RING HOLDER EDGES BELOW THE MINIMUM "X" DIMENSION SPECIFIED IN TABLE 6-1.

CAUTION 3: NO UNDERCUT OF THE INSULATING COMPOUND BETWEEN COPPER SLIP RINGS IS REQUIRED. THE HEIGHT OF THE INSULATING COMPOUND MAY NOT EXCEED THE HEIGHT OF THE COPPER SLIP RINGS.

- (6) Make a light cut at a depth of no greater than 0.002 - 0.004 inch (0.05 - 0.10 mm) per pass at the specified feed rate and RPM. Cut no deeper than necessary to remove surface damage. The copper ring surface and slip ring holder must be cut as shown in Figure 6-1.
- (7) The final surface finish must be 32 micro inches or better.
- (8) The surface of the copper rings and slip ring holder edges must be parallel to the mounting surface within 0.005 inch (0.12 mm) over 360 degrees of rotation. Run-out of the contact surfaces must be within 0.002 inch (0.05 mm) over a 4.0 inch (101 mm) arc.
- (9) Use abrasive pad CM47 and deburr the edges and surfaces as necessary.
- (10) Using approved solvent CM128 or CM106, thoroughly clean the copper rings.

CAUTION: COPPER RING SURFACES MUST BE FREE OF ANY CHEMICAL CONVERSION COATING.

- (11) Apply a chemical conversion coating to any exposed aluminum surfaces on the slip ring holder in accordance with the Chromic Acid Anodizing chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02).
- (12) Measure the continuity after the resurfacing in accordance with the the section, "De-ice Slip Ring Assembly Insulation Resistance Checks" in the Check chapter of this manual.

**B. De-ice Slip Ring Resurfacing for 4(E,H)2811-( )**

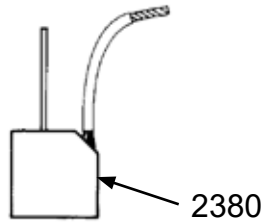
- (1) Determine minimum dimension. Refer to Figure 6-2.
  - (a) Measure the copper ring height "X".
  - (b) Measure the depth of the wear groove, "Y".
  - (c) If "Y" is equal or greater than "X", replace the slip ring assembly.
  - (d) If "Y" is less than "X", resurface the copper rings in accordance with the Paragraph 2.A.

**C. Slip Ring Lead Wire Replacement**

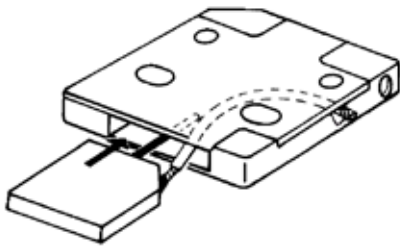
- (1) There is a frayed or broken wire.
  - (a) Repair or replace the wire with a wire of equivalent length, gauge, and quality.
- (2) There is a wire broken at the stud.
  - (a) Put the assembly ring side down on a metal surface.

**CAUTION:** THE TEMPERATURE OF THE ASSEMBLY SHOULD NOT RISE ABOVE 200°F (93°C) ANYWHERE EXCEPT AT THE STUD. AVOID EXCESSIVE HEATING OF THE ASSEMBLY OR THE STUDS WHEN REPAIRS ARE PERFORMED. USE A HIGH WATTAGE SOLDERING GUN AND WORK AS QUICKLY AS POSSIBLE.

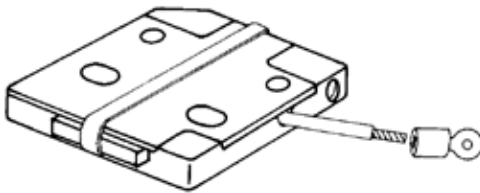
- (b) Using a high amperage soldering iron, heat the stud enough to melt the solder to remove the broken wire.
- (c) Remove the broken wire and solder from the stud.
- (d) Using core solder CM195, solder a new wire of equivalent length, gauge, and quality in place.
- (e) Using solvent CM106 or CM128, clean area around the stud and the stud.
- (f) Replace the shrink tubing and terminal ends with suitable type.
- (g) Using an ohmmeter, measure the continuity after the wire replacement in accordance with the section, "De-ice Slip Ring Assembly Insulation Resistance Checks" in the Check chapter of this manual.



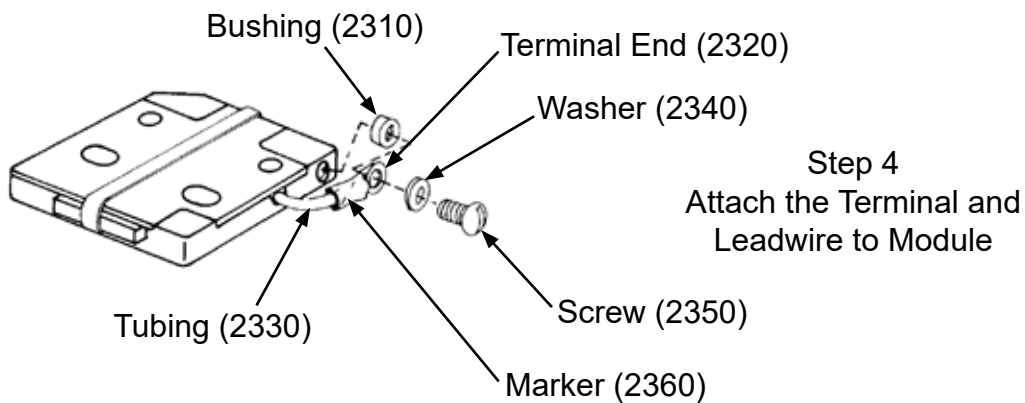
Step 1  
Form the Replacement  
Brush Leadwire



Step 2  
Thread the Leadwire  
through the Exit Hole



Step 3  
Secure the Brush with  
a Rubber Band



Brush Replacement  
Figure 6-3

TI-18002

**D. Brush Replacement**

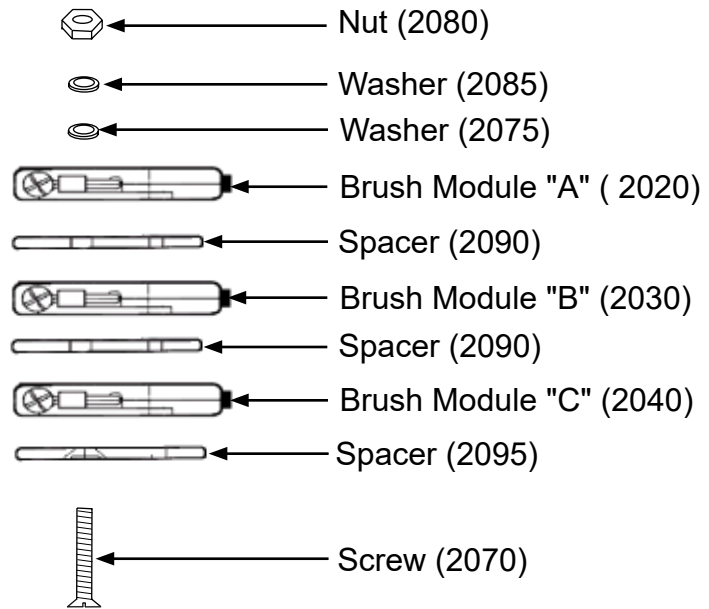
**CAUTION:** MAKE NOTE OF THE BRUSH WIRE MARKER. THE WIRE MARKER WILL BE A, B, OR C.

- (1) Make a record of the brush identification.
- (2) Remove and keep the screw (2350), washers (2340), and spacers (2310) if applicable, that attach the ring terminal to the brush module. Refer to Figure 6-3.
- (3) Remove and discard the ring terminal (2320) from the brush leadwire.
- (4) Remove and discard the brush (2380) and tubing (2330) through the slot in the module.
- (5) Inspect the brush slot for uneven wear and replace if there is uneven wear has occurred.
- (6) Inspect the inside of the brush module assembly for unwanted material. Remove any unwanted material.

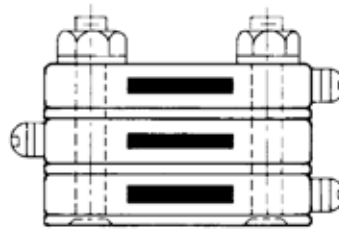
**WARNING:** THE BRUSH MODULE ASSEMBLY IS BONDED TOGETHER. DO NOT SEPARATE THE BASE FROM THE LID.

- (7) Using cleaning solvent CM118, CM23 or equivalent and a soft bristle brush, clean the inside and outside of the brush module assembly to remove carbon deposits, as required.
- (8) Install new insulation tubing (2330) over the leadwire of the new brush (2380) so that the end of the tubing almost contacts the brush.
  - (a) Using cleaning solvent CM23, CM118, or equivalent, soak the new insulation tubing (2330) in solvent until pliable to ease installation.
  - (b) Install tubing (2330) over the brush lead (2380).
- (9) Slightly bend the brush leadwire into an arc as shown in Figure 6-3.
- (10) Insert the brush and leadwire into the brush slot of the brush module assembly, until the leadwire comes out of the leadwire hole as shown in Figure 6-3.
- (11) Compress the brush and pull the maximum amount of the leadwire out of the hole in the brush module assembly.
- (12) Secure the compressed brush (2380) in the brush module assembly with a rubber band or equivalent as shown in Figure 6-3.
- (13) Slide the insulation tubing (2330) to within 0.187 inch (4.749 mm) of the end of the leadwire.
- (14) Install a new ring terminal (2320) so that the end of the insulation tubing (2330) is inside the jacket of the ring terminal and no bare leadwire is exposed.
- (15) Using crimping tool AMP 47387 or equivalent, crimp the ring terminal (2320) in place.

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180



Standard Stacking  
Configuration



Alternate Stacking  
Configuration

TPLHPL2011  
 TI-18004ALTERNATEARRANGEMENT

**Brush Module Replacement**  
**Figure 6-4**

- (16) Replace the screw (2350), washer (2340), and spacer(s) (2310).
- (17) Remove the rubber band and carefully pull the brush (2380) until all slack in the leadwire is encased in the brush module assembly. Compress and release the brush to make sure that it does not bind or hang up inside the brush module assembly.

**E. Brush Module Replacement**

- (1) Remove the modular brush block assembly from the aircraft in accordance with the TC or STC holder's ICA.
- (2) Remove the nuts (2080) and washers (2075, 2085) that secure the brush module assemblies together.
  - (a) Keep the nuts (2080) and discard the washers (2075, 2085).
- (3) Remove and keep the assembly screws (2070) and separate the brush module assemblies (2020, 2030, 2040) and spacers (2090, 2095).
  - (a) Keep the spacers (2090, 2095) and serviceable brush module assemblies (2020, 2030, 2040).
- (4) Replace the worn brush module assembly (2020, 2030, 2040) with an applicable replacement brush module assembly.
  - (a) Refer to the Appendix section in the Airframe De-ice Kit Installation and Parts chapter of this manual to determine the applicable brush model assembly part number.
    - 1 The part number is etched on each brush module assembly.
    - 2 Alternatively, a correctly configured universal brush module assembly can be used.
  - (b) A brush worn below minimum specifications may be replaced in accordance with the section, "Brush Replacement" in this chapter.
- (5) Assemble the brush module assemblies (2020, 2030, 2040) and spacers (2090, 2095) in accordance with the Appendix section in the Airframe De-ice Kit Installation and Parts chapter of this manual
  - (a) If there is interference between the adjacent ring terminals, adjust the center brush module assembly as shown in Figure 6-4, Alternate Stacking Arrangement.
- (6) Install the flat washer (2075) between the module (2020, 2030, 2040) and the lock washer (2085).
- (7) Install the brush module assemblies (2020, 2030, 2040) and spacers (2090, 2095). Make sure the brush module assembly is squarely positioned and tighten the screws (2070). Use care to not overtighten.
- (8) Install the modular brush block assembly on the aircraft in accordance with the TC or STC holder's ICA.
- (9) Align the brushes to the slip ring assembly in accordance with the Assembly chapter of this manual.



F. Slip Ring Interchangeability

- (1) The Hartzell Propeller 4H1964-3 slip ring assembly and 4E1964-4 slip ring assembly are drilled with one hole for installation of a synchrophaser target.
- (2) The Hartzell Propeller 4H1964-3 slip ring assembly has a synchrophaser target installed in the hole.
- (3) The Hartzell Propeller 4H1964-4 slip ring assembly does not have a synchrophaser target installed in the hole.
- (4) A 2H1377 synchrophaser target may be installed in the hole on the 4H1964-4 slip ring assembly and the slip ring will become an 4H1964-3 slip ring assembly.
- (5) Modification of a Hartzell Propeller 4H1964-3 slip ring assembly to a Hartzell Propeller 4H1964-4 slip ring assembly.
  - (a) Remove the 2H1377 synchrophaser target.
  - (b) Re-identify the slip ring assembly as an 4H1964-4 slip ring assembly in accordance with Hartzell Propeller Standard Practices Manual 202A (61-01-02).
- (6) Modification of a Hartzell Propeller 4H1964-4 slip ring assembly to a Hartzell Propeller 4H1964-3 slip ring assembly.
  - (a) Install an 2H1377 synchrophaser target as required in the hole on the 4H1964-4 slip ring assembly.
    - 1 Apply sealant CM74 on the threads of the 2H1377 synchrophaser target.
    - 2 Install the 2H1377 synchrophaser target in the slip ring assembly. The 2H1377 synchrophaser target must sit firmly against the slip ring assembly after installation.
    - 3 Torque the synchrophaser target 2 - 3 in-Lbs. (0.23 - 0.34 N•m).
    - 4 Permit sealant CM74 to dry.
  - (b) Re-identify the slip ring assembly as an 4H1964-3 slip ring assembly in accordance with Hartzell Propeller Standard Practices Manual 202A (61-01-02).

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**G. 4(E,H)2422 Slip Ring Mounting Screw (1141) Replacement**

- (1) As required, remove the slip ring mounting screw (1141).
- (2) Using an approved solvent CM11, CM21, CM41, or CM106, thoroughly clean the threads and external surface of the slip ring assembly (1140) to remove adhesive CM74.
- (3) Apply adhesive CM74 to the threads of the slip ring assembly (1140).
- (4) Install the slip ring mounting screws (1141), as required.
- (5) Torque the slip ring mounting screw (1141) 3 - 5 Ft. Lbs. (4.06 - 6.77 N•m).
- (6) Allow to cure a minimum of eight hours before propeller installation.

**H. Repair of De-ice Split Mounting Plate -  
P/N 7931-4E1881 and 7931-3E1951 (1130)**

- (1) Create a counterbore around the attaching hole to remove damage. Machine to a depth sufficient to remove all damage.
  - (a) The minimum permitted thickness of the slip ring split mounting plate in the counterbored area is 0.080 inch (2.03 mm).
  - (b) The counterbore must have a diameter of 0.937 +/- 0.010 inch (23.80 +/- 0.254mm) centered on the attaching hole.
  - (c) A maximum corner radius 0.005 inch (0.127 mm) is permitted.
  - (d) The counterbore must have a surface finish of 125Ra or better.
  - (e) The counterbore must be parallel to the opposite side within 0.002 inch (0.05 mm).
  - (f) If all the damage cannot be removed within the above limits, replace the slip ring split mounting plate with a serviceable unit.

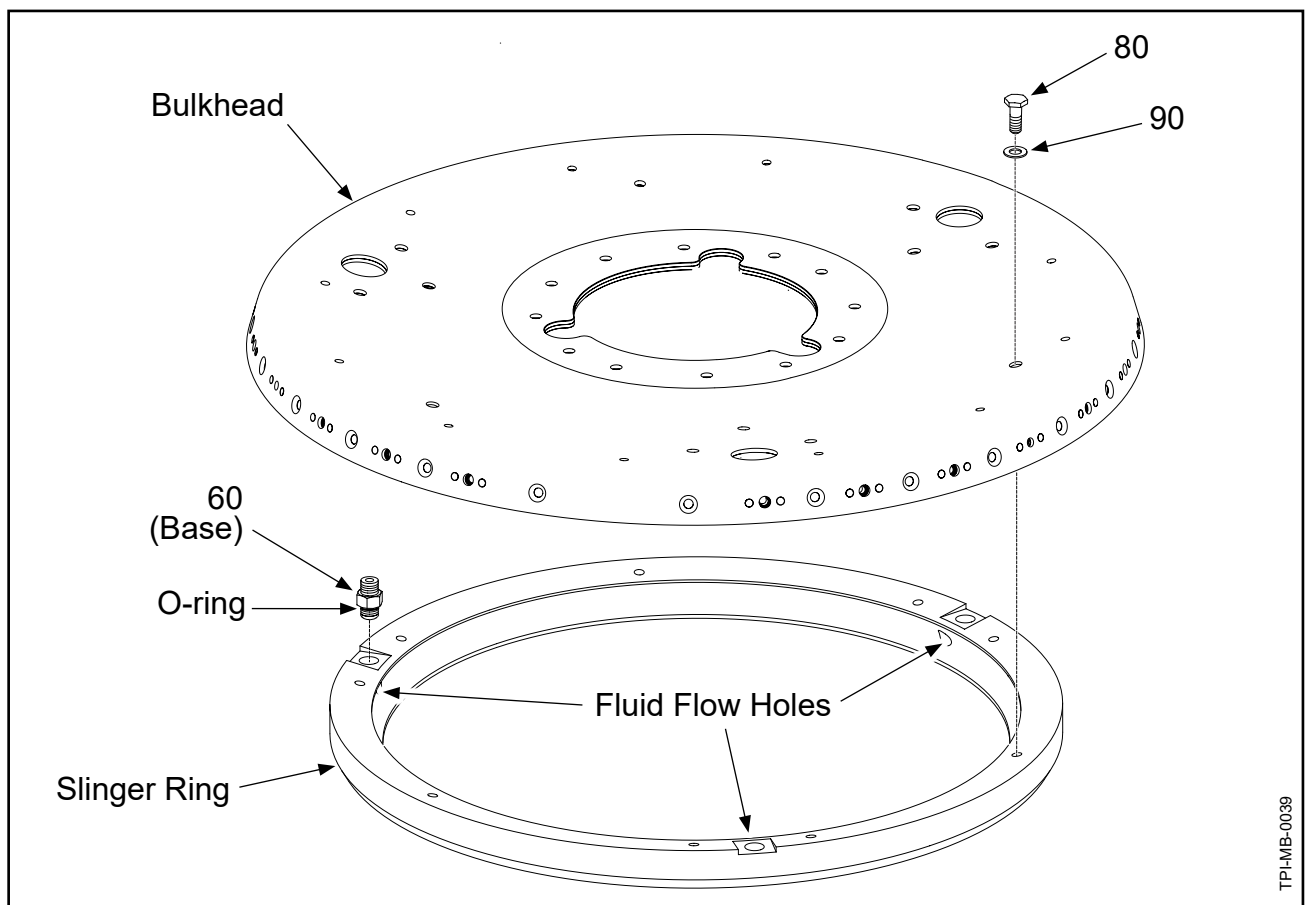
**HARTZELL ICE PROTECTION SYSTEM  
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I. Slinger Ring Replacement for Bulkhead Units 104744 and 106109

- (1) Remove the travel tube weldment (5020) and the anti-ice bracket (10).
  - (a) Refer to the installation instructions and figures for the applicable anti-ice kit in the Anti-ice Kit Installation and Parts chapter of this manual to remove the travel tube weldment and anti-ice bracket.
- (2) Remove three hex head bolts (80) and three washers (90) from the bulkhead.

**CAUTION:** DO NOT DAMAGE THE BULKHEAD WHEN REMOVING THE SLINGER RING.

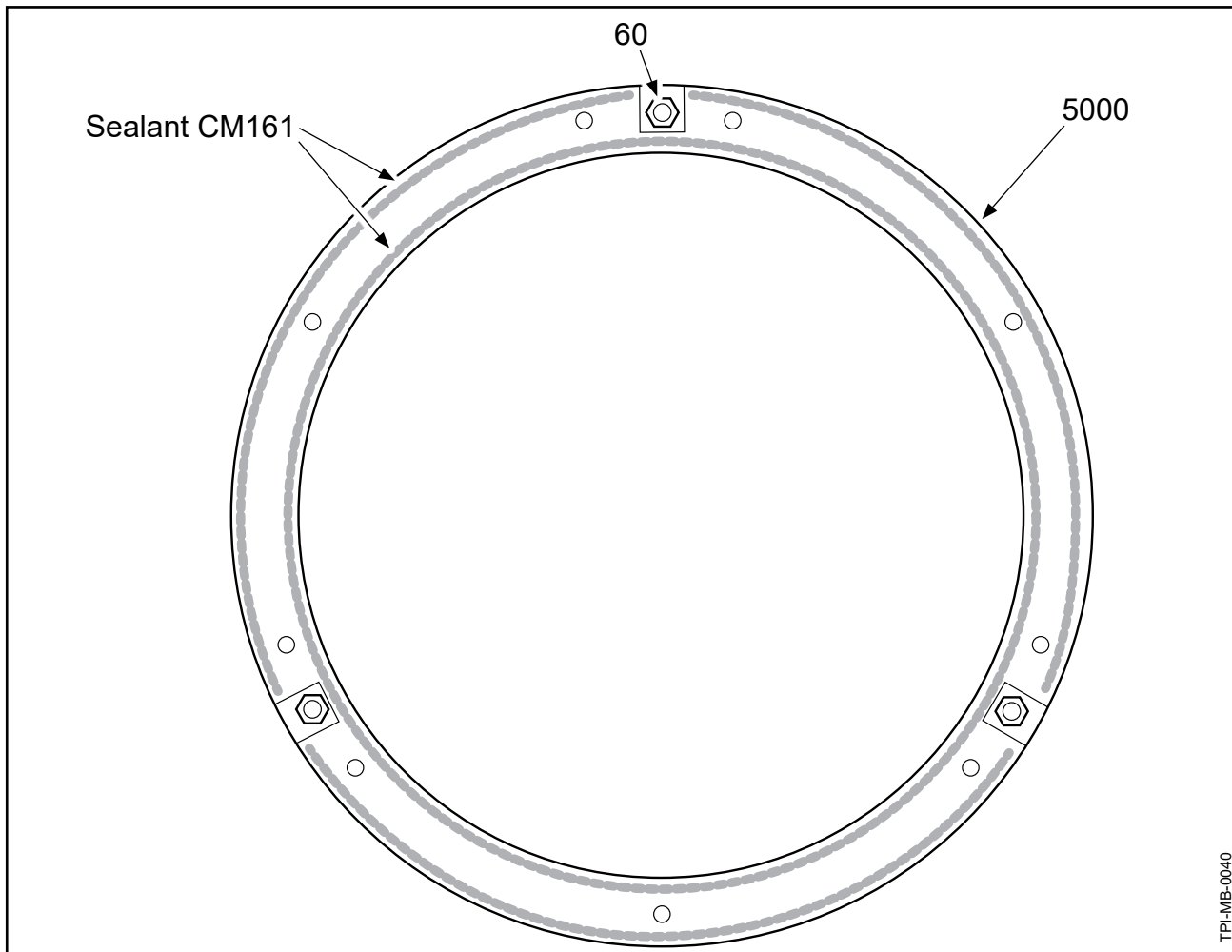
- (3) There are multiple methods to separate the slinger ring from the bulkhead. Hartzell Propeller LLC recommends the use of a plastic wedge(s) and a rubber mallet.



**Slinger Ring Replacement for Bulkhead Units 104744 and 106109  
Figure 6-5**

**HARTZELL ICE PROTECTION SYSTEM  
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- (4) Using the plastic wedge(s) and the rubber mallet, separate the slinger ring from the bulkhead.
  - (a) If the bulkhead is scratched, gouged, or damaged during removal of the slinger ring, refer to Hartzell Propeller Metal Spinner Maintenance Manual 127 (61-16-27).
- (5) Remove and discard the slinger ring.
  - (a) Discard the bases of the three fittings (60) that are installed in the slinger ring.
- (6) Using MEK CM106, acetone CM11, toluene CM41, or isopropyl alcohol CM183, clean the slinger ring mounting surface on the aft side of the bulkhead, the forward mounting surface of the slinger ring, three fittings (60), three hex head bolts (20), and three washers (30).



**Applying Sealant to the Slinger Ring  
Figure 6-6**

**CAUTION:** DO NOT GET LOCTITE 222 CM21 ON THE FERRULE OR CAP-SIDE OF THE FITTING (60).

- (7) Apply Loctite 222 CM21 to the threads below the O-ring on the base of the three fittings (60).
- (8) Install the base of each fitting (60) into the slinger ring.
- (9) Torque the base of each fitting (60) to 102-112 In-Lbs (11.5-12.6 N•m).
- (10) Place the slinger ring with the fittings (60) facing up, and the bulkhead with the aft-surface facing up, on a clean surface.

**CAUTION:** FOAM PLUGS OR SIMILAR MASKING DEVICES MAY BE USED TO PREVENT SEALANT FROM RESTRICTING THE FLUID FLOW HOLES IN THE SLINGER RING. FLUID FLOW HOLES MAY BE CLEANED WITH A SOLVENT SOAKED COTTON SWAB OR SIMILAR DEVICE AS NEEDED.

- (11) Use masking plugs as required to prevent sealant from restricting the three fluid flow holes in the slinger ring.
- (12) Mix sealant CM161 per the manufacturer's instructions.
- (13) Using a syringe, apply two beads of sealant CM161 to the forward mounting surface of the slinger ring in accordance with Figure 6-6.
  - (a) Apply one uninterrupted bead of sealant CM161 around the inner edge of the slinger ring.
  - (b) Apply one bead of sealant outside the row of tapped mounting holes between each fitting (60).
- (14) Align the mounting holes in the slinger ring with the mounting holes in the bulkhead. Refer to Figure 6-5.
- (15) Apply Loctite 222 CM21 to the threads of three hex head bolts (80).
- (16) Install three hex head bolts (80) and three washers (90) into the mounting holes located halfway between the fittings (60) in accordance with Figure 6-5.
  - (a) Hand tighten the three hex head bolts (80) evenly until the slinger ring (5000) makes contact with the bulkhead.

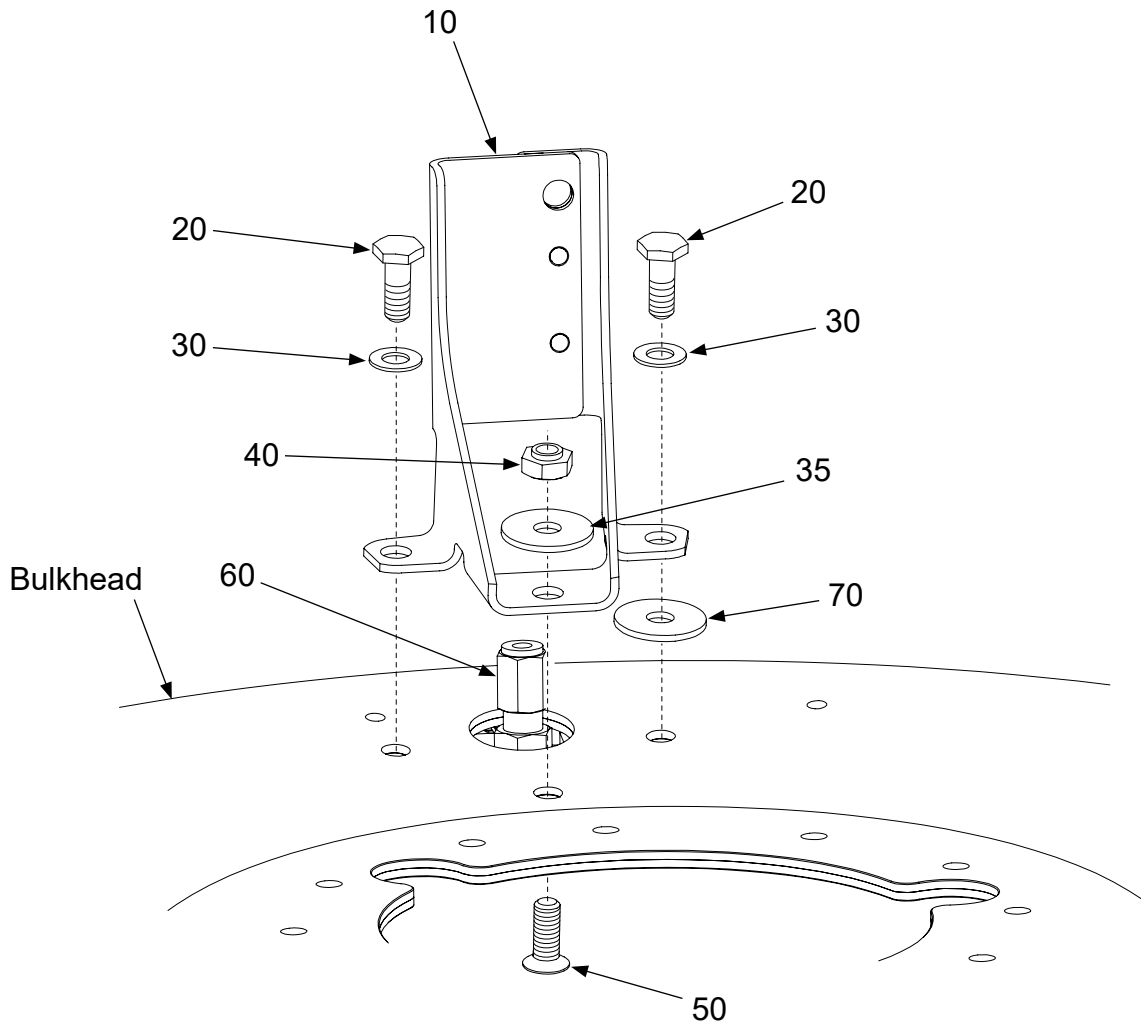
**HARTZELL ICE PROTECTION SYSTEM  
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- (17) Align one bracket weldment (10) with the fitting (60) and the mounting holes at the fluid flow location on the bulkhead in accordance with Figure 6-7.
- (18) Apply Loctite 222 CM21 to the threads of two hex head bolts (20) and one screw (50).
- (19) Install the two hex head bolts (20) and two washers (30) through the two outer mounting holes in the bracket weldment (10) in accordance with Figure 6-7.
  - (a) Hand-tighten the two hex head bolts (20) evenly until the slinger ring (5000) makes contact with the bulkhead.
- (20) Install the screw (50) from the aft side of the bulkhead through the inner mounting hole of the bracket weldment (10), then install the washer (30) and the nut (40) in accordance with Figure 6-7.
- (21) Repeat steps (18) thru (21) of this procedure at each fluid flow location on the bulkhead.
- (22) Using a criss-cross pattern, gradually torque the three hex head bolts (80) and six hex head bolts (20) to 96-120 In-Lbs (10.8-13.5 N•m).
- (23) Torque the three nuts (40) to 96-120 In-Lbs (10.8-13.5 N•m).
- (24) Inspect the parting line between the slinger ring and the bulkhead.
  - (a) Clean and smooth any excess sealant to form a fillet at the parting line.
  - (b) If there are gaps in the sealant at the parting line, use additional sealant CM161 to form an uninterrupted fillet.

**CAUTION:** SEALANT CM161 MAY BE HANDLED AFTER 2 HOURS,  
BUT REQUIRES 6-8 HOURS FOR A TACK FREE CURE.

- (25) Clean any excess sealant from other surfaces using MEK CM106, acetone CM11, toluene CM41, or isopropyl alcohol CM183.

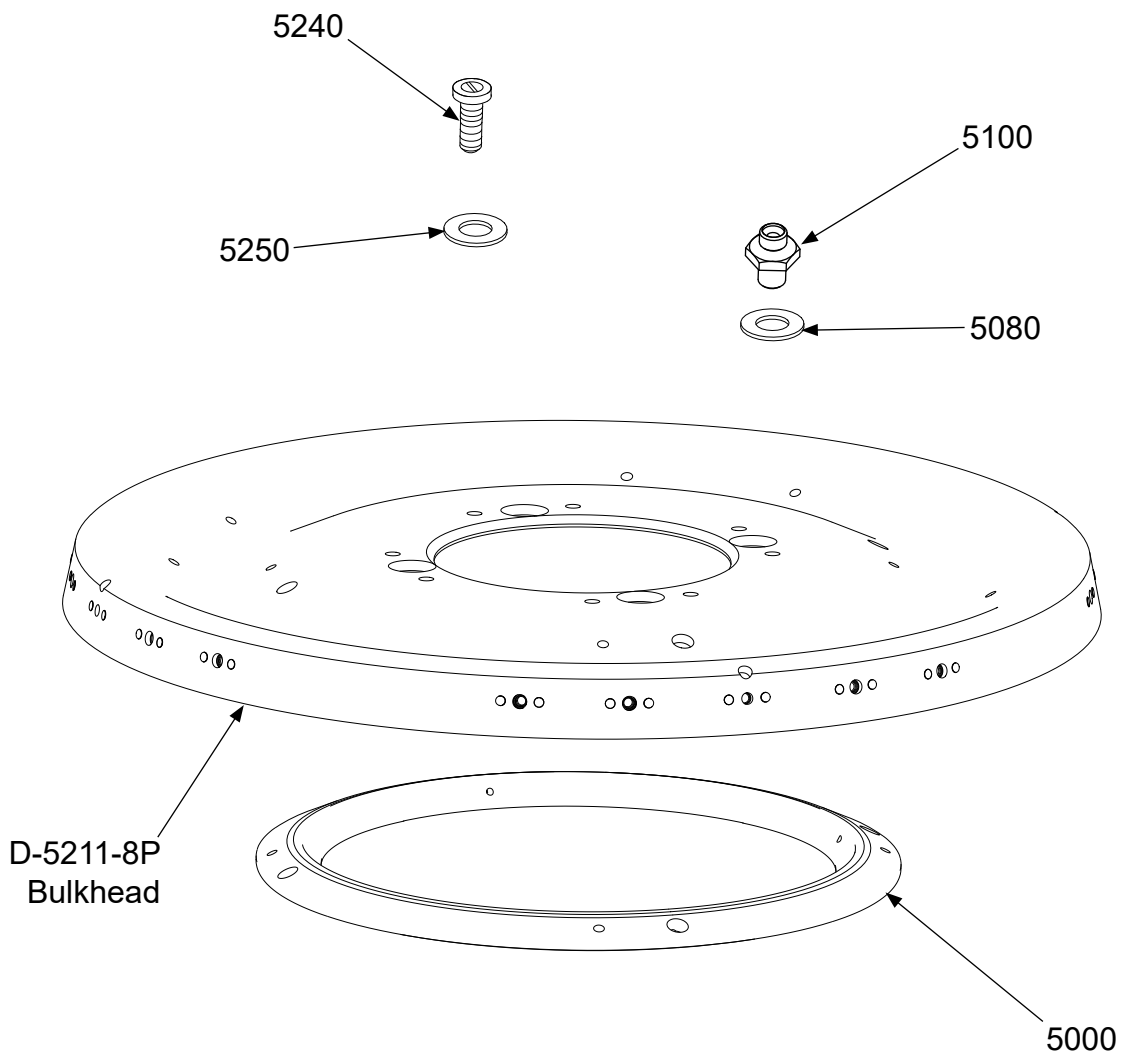
HARTZELL ICE PROTECTION SYSTEM  
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TPL-MB-0114

Anti-ice Bracket Installation  
Figure 6-7

HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180



TI-181-SLINGERRING-QUEST

**Slinger Ring Assembly Replacement for Anti-Ice Kit 105395**  
**Figure 6-8**



**J. Slinger Ring Assembly Replacement for Anti-ice Kit 105395**

**(1) Replacement procedure**

- (a) Remove and discard the safety wire from the special studs (5100) and screws (5240). Refer to Figure 6-8.
- (b) Remove and discard the screws (5240) and washers (5250) that attach the slinger ring assembly (5000) to the spinner bulkhead.
- (c) Remove the nut from the special stud (5100).

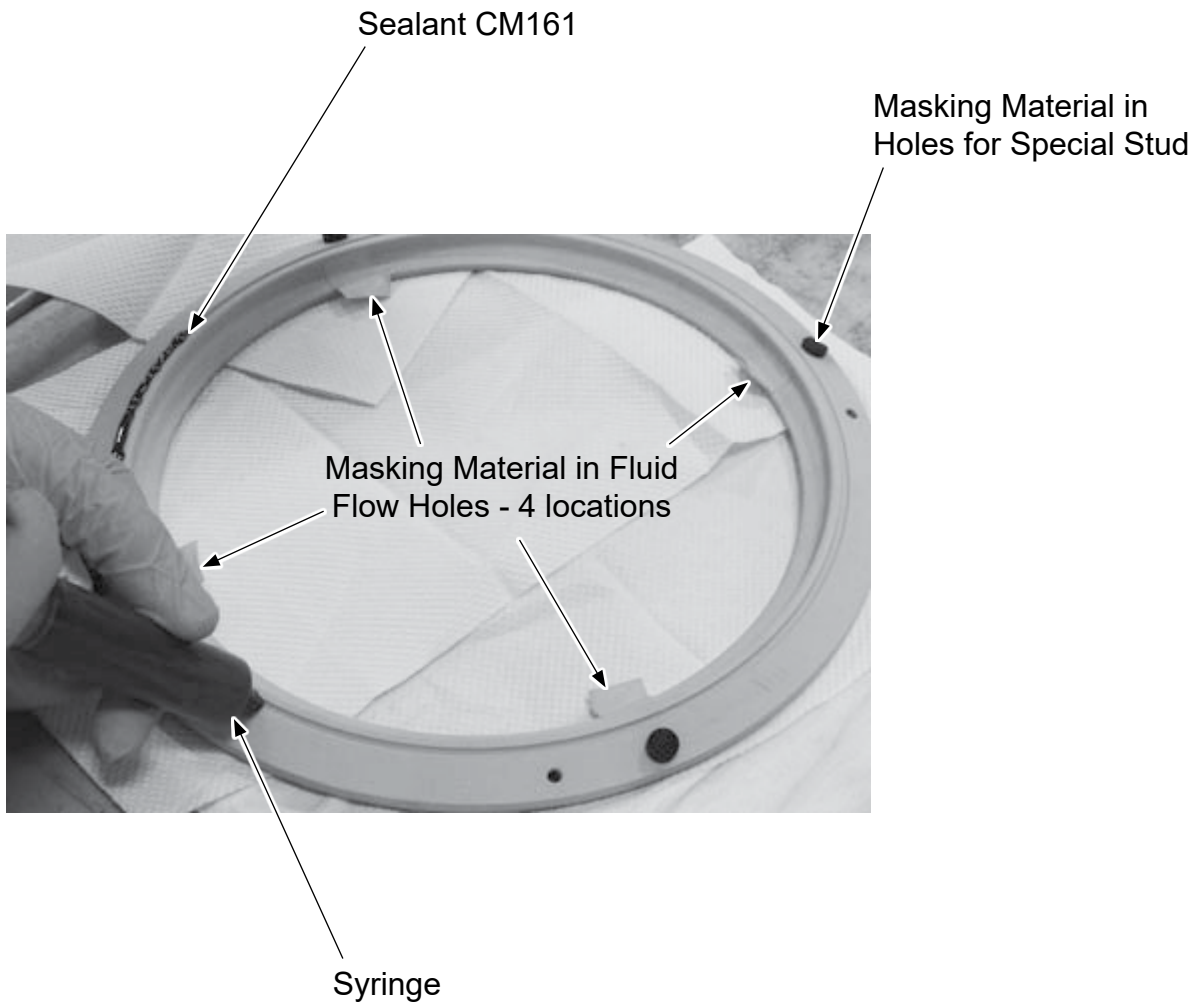
**NOTE:** The nut may remain on the travel tube.

**(d) Slinger Ring Removal from Bulkhead**

- 1 There are multiple methods to separate the slinger ring assembly (5000) from the spinner bulkhead.
- 2 Hartzell Propeller LLC recommends the use of a metal or plastic wedge or similar tools and a rubber mallet.
- 3 Using the wedges and the rubber mallet, separate the slinger ring assembly (5000) from the bulkhead.
- 4 If the bulkhead is scratched, gouged, or damaged during removal of the slinger ring assembly, refer to Hartzell Propeller Metal Spinner Maintenance Manual 127 (61-16-27).
- 5 Remove and discard the slinger ring assembly (5000).
- 6 Using the wedges, cleaning solvent, CM106 MEK, CM11 Acetone, CM41 Toulene, or CM219 MPK, and an abrasive pad, CM47 or equivalent, remove all remaining traces of sealant from the bulkhead.

**(2) Slinger Ring Assembly Installation on the Spinner Bulkhead**

- (a) Using cleaning solvent, CM106 MEK, CM11 Acetone, CM41 Toulene, or CM219 MPK, and an abrasive pad, CM47 or equivalent, clean the area of the spinner bulkhead for installation of the new slinger ring assembly (5000).
- (b) Using cleaning solvent, CM106 MEK, CM11 Acetone, CM41 Toulene, or CM219 MPK, clean the mounting surface of the new slinger ring assembly (5000).



TI-SB352\_sealant

**Masking of the Slinger Ring Assembly and Application of Sealant to Groove**  
**Figure 6-9**

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**CAUTION:** MAKE SURE THAT THE SEALANT CM161 DOES NOT CAUSE A BLOCKAGE TO THE FLUID FLOW HOLES IN THE BULKHEAD FOR THE FOUR SPECIAL STUDS (8) DURING ASSEMBLY. FLUID HOLES MAY BE CLEANED WITH A SOLVENT SOAKED COTTON SWAB OR SIMILAR DEVICE AS NEEDED.

- (c) Using masking material, mask the fluid flow holes in the new slinger ring assembly (5000) where the special studs will be installed. Refer to Figure 6-9.
- (d) Mix the sealant CM161 in accordance with manufacturer's instructions.
- (e) Apply the sealant CM161 to the groove in the new slinger ring assembly (5000). The sealant should slightly over-fill the groove. Refer to Figure 6-9.

**NOTE:** Using a syringe is the easiest method to fill the groove in the new slinger ring assembly (5000).

- (f) Put the slinger ring assembly (5000) on the spinner bulkhead, aligning the holes in the new slinger ring assembly (5000) with the applicable holes in the spinner bulkhead.
- (g) Apply sealant CM161 to four screws (5240).
- (h) Using screws (5240) and washers (5250), attach the new slinger ring assembly (5000) to the spinner bulkhead in accordance with Figure 6-8.
  - 1 Hand tighten the screws (5240) but do not torque at this time.
- (i) Remove the masking material from the holes for the special stud (5100) in the slinger ring assembly (5000).
- (j) Install the washer (5080) on each of the four special studs (5100). Refer to Figure 6-8.
- (k) Apply sealant CM161 to the threads of the four special studs (5100). Refer to Figure 6-8.
- (l) Install the four special studs (5100) with the washers (5080) through the threaded holes in the spinner bulkhead and into the slinger ring assembly (5000). Refer to Figure 6-8.
- (m) Using an alternating sequence, torque each special stud (5100) to 81-99 In-Lbs (9.1-11.2 N•m).
- (n) Using an alternating sequence, torque each screw (5240) to 15-20 In-Lbs (1.7-2.2 N•m).
- (o) Examine the seal line between the spinner bulkhead and the slinger ring assembly (5000) for excessive sealant squeeze-out.

**HARTZELL ICE PROTECTION SYSTEM  
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- (p) Using a gloved finger or a cloth dampened with an approved solvent, clean and smooth any excess sealant that squeezed out from around the screws (5240), special studs (5100), or between ID or OD of the slinger ring assembly (5000) and the spinner bulkhead.
- (q) Remove the masking material from the fluid flow holes in the slinger ring assembly (5000).
- (r) Inspect the fluid holes and if required, use a cotton swab dampened with solvent to clean remove excess sealant that may block the flow of the anti-icing fluid.
- (s) Let the sealant to dry for 6 to 8 hours. The spinner bulkhead/slinger ring assembly may be handled with care after 2 hours.
- (t) Install and align the feed tube (5020) in accordance with the applicable installation instructions in the Anti-ice Kit Installation and Parts chapter of this manual.

**K. Replacement of Rivets**

**CAUTION 1:** DO NOT MAKE THE HOLE OVERSIZE WHEN DRILLING OUT THE RIVET.

**CAUTION 2:** WHEN REPLACING RIVETS IN THE 106107 ANTI-ICE BRACKET, DO NOT DRILL OUT BOTH RIVETS AT THE SAME TIME. REPLACE ONE RIVET AT A TIME TO PREVENT DEFORMATION OF THE BRACKET.

- (1) Using the appropriate drill bit, drill out the rivet.
- (2) Replace the rivet in accordance with the procedures in the FAA Advisory Circular 43.13-1B.
- (3) The following rivets may be replaced:
  - (a) B-3847-5              Rivet, 100° head, 0.094 diameter, aluminum

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**L. Slip Ring Modification and Interchangeability**

- (1) A slip ring assembly that is used on an application with synchrophasing requirements requires holes for installation of a synchrophaser target. Refer to Table 6-2 for the original configuration of a slip ring assembly.
- (2) Except for the synchrophaser target and/or the hole(s) for installation of a synchrophaser target, one slip ring of the same base part number may be identical to another slip ring assembly.
- (3) A slip ring assembly with holes for a synchrophaser target may be used on an application without synchrophasing requirements when the synchrophaser target is removed.

<b>Original Slip Ring Configuration When Supplied by Hartzell Propeller LLC</b>	
4(E,H)1555-1	No synchrophaser target holes.
4(E,H)1555-2	Three (3) synchrophaser target holes and three (3) synchrophaser targets are installed.
4(E,H)1555-3	Three (3) synchrophaser target holes and three (3) synchrophaser targets are installed.
4(E,H)1964-2	No synchrophaser target holes.
4(E,H)1964-3	One (1) synchrophaser target hole and one (1) synchrophaser target is installed.
4(E,H)1964-4	One (1) synchrophaser target hole but a synchrophaser target is not installed.
4(E,H)2674-1	No synchrophaser target holes.
4(E,H)2674-2	Eight (8) synchrophaser target holes but synchrophaser target(s) are not installed.

**Slip Ring Assembly Original Configuration  
Table 6-2**

**HARTZELL ICE PROTECTION SYSTEM  
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- (4) A slip ring assembly without holes for a synchrophaser target or with a different hole pattern for synchrophaser target(s) may be modified in accordance with Table 6-3.
- (a) Modify the slip ring assembly in accordance with the instructions specified in Table 6-3.
- (b) A slip ring assembly modified in accordance with the instructions in Table 6-3 is an alternate for slip ring assemblies as specified in Table 6-4.

<b>Original Slip Ring Configuration</b>	<b>Slip Ring Configuration Needed</b>	<b>Modification Instruction and Slip Ring Assembly Configuration</b>
4(E,H)1555-1	4(E,H)1555-2 or 4(E,H)1555-3	Modify in accordance with Figure 6-10 and the section, "Slip Ring Modification and Interchangeability" in this chapter  Synchrophaser targets installed in accordance with TC or STC holder's ICA or Figure 6-13
4(E,H)1555-2	4(E,H)1555-3	Modify in accordance with Figure 6-10 and the section, "Slip Ring Modification and Interchangeability" in this chapter  Synchrophaser targets installed in accordance with TC or STC holder's ICA or Figure 6-13
4(E,H)1555-3	4(E,H)1555-2	Modify in accordance with Figure 6-10 and the section, "Slip Ring Modification and Interchangeability" in this chapter  Synchrophaser targets installed in accordance with TC or STC holder's ICA or Figure 6-13
4(E,H)1964-2	4(E,H)1964-3	Modify in accordance with Figure 6-11 and the section, "Slip Ring Modification and Interchangeability" in this chapter  Synchrophaser target 2H1377 installed
4(E,H)1964-2	4(E,H)1964-4	Modify in accordance with Figure 6-11 and the section, "Slip Ring Modification and Interchangeability" in this chapter  No synchrophaser target installed
4(E,H)1964-4	4(E,H)1964-3	Synchrophaser target 2H1377 installed
4(E,H)2674-1	4(E,H)2674-2	Modify in accordance with Figure 6-12 and the section, "Slip Ring Modification and Interchangeability" in this chapter  Synchrophaser target installed in accordance with TC or STC holder's ICA

**Slip Ring Assembly Modification Instructions  
Table 6-3**

**HARTZELL ICE PROTECTION SYSTEM  
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<b>Slip Ring Assembly</b>	<b>Alternate</b>	<b>Configuration</b>
4(E,H)1555-1	4(E,H)1555-1 MOD, 4(E,H)1555-2, 4(E,H)1555-2 MOD, 4(E,H)1555-3, 4(E,H)1555-3 MOD	without a synchrophaser target installed
4(E,H)1555-2	4(E,H)1555-1 MOD, 4(E,H)1555-2MOD, 4(E,H)1555-3 MOD	with synchrophaser targets installed in accordance with Figure 6-14 or TC/STC holder's ICA
4(E,H)1555-3	4(E,H)1555-1 MOD, 4(E,H)1555-2 MOD, 4(E,H)1555-3 MOD	with synchrophaser targets installed in accordance with Figure 6-14 or TC/STC holder's ICA
4(E,H)1964-2	4(E,H)1964-2 MOD, 4(E,H)1964-3, 4(E,H)1964-4	without a synchrophaser target 2H1377 installed
4(E,H)1964-3	4(E,H)1964-2 MOD, 4(E,H)1964-4	with a synchrophaser target 2H1377 installed in accordance with TC/STC holder's ICA
4(E,H)2674-2	4(E,H)2674-1 MOD	with a synchrophaser target installed in accordance with TC/STC holder's ICA
4(E,H)2674-1	4(E,H)2674-2, 4(E,H)2674-1 MOD	without synchrophaser targets installed

**Slip Ring Assembly Alternates After Modification  
Table 6-4**

(5) Slip Ring Modification

- (a) Refer to Table 6-3 to determine the applicable Slip Ring Assembly Modification Instruction.

**CAUTION:** DO NOT PERMIT THE DRILLED HOLE TO CONTACT THE COPPER SLIP RING.

- (b) Drill a synchrophaser target hole in the location(s) specified:
- 1 Using a #50 drill bit, drill a hole 0.070 inch (1.77 mm) in diameter to a maximum depth of 0.166 inch (4.22 mm).
  - 2 Using a 2-56 UNC-2B tap, tap the hole to a maximum depth of 0.135 inch (3.43 mm) with a minimum full thread depth of 0.100 inch (2.54 mm).
- (c) Chamfer the hole 45 +/- 5 degrees to a diameter of 0.093 - 0.113 inch (2.36 - 2.87 mm).
- (d) If copper from the copper ring is exposed in a hole, a synchrophaser target may not be installed in that hole.
- 1 If copper from the copper ring is exposed and another hole can be used for installation of the synchrophaser target, plug the unused hole that has exposed copper using adhesive CM93-1 RTV123 or equivalent.
  - 2 If copper from the copper ring is exposed and another hole cannot be used for installation of the synchrophaser target, replace the slip ring assembly. The slip ring assembly is not serviceable.
- (e) After slip ring modification, use an ohmmeter to measure the continuity in accordance with the section, "De-ice Slip Ring Assembly Insulation Resistance Checks" in the Check chapter of this manual.

(6) Stamping of "MOD" on the Modified Slip Ring Assembly

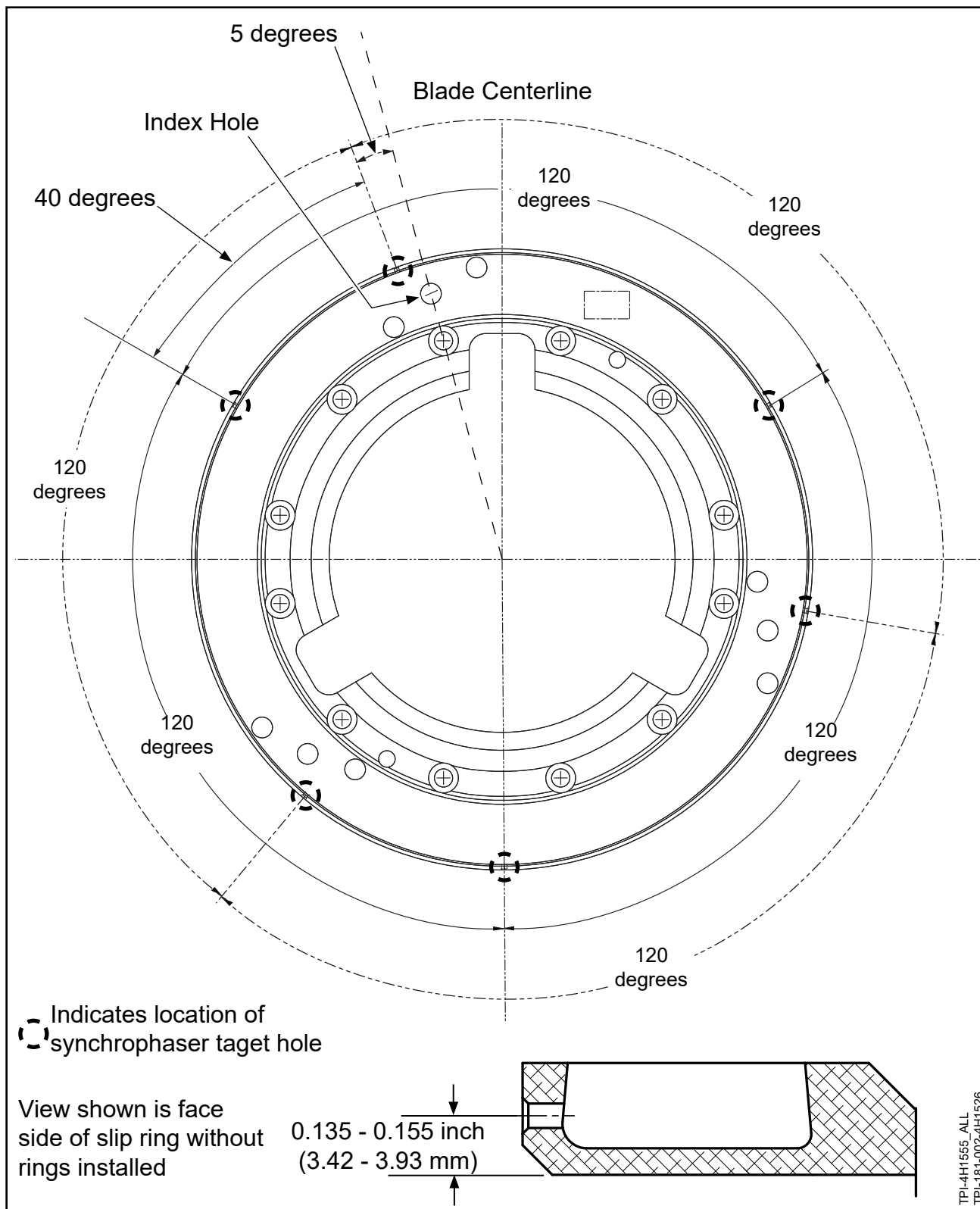
- (a) Using a round bottom impression stamp, stamp the applicable modification configuration immediately following the slip ring part number in accordance with Slip Ring Assembly Modification Instructions.

Example: A 4H1964-3 slip ring assembly is required. A 4H1964-2 is available. The 4H1964-2 is modified in accordance with the instructions specified in Table 6-3. Installation of the synchrophaser target and stamping MOD at the end of the aprt number, 4H1964-2 MOD, permits the slip ring assembly to be used as an alternate for the 4H1964-3.

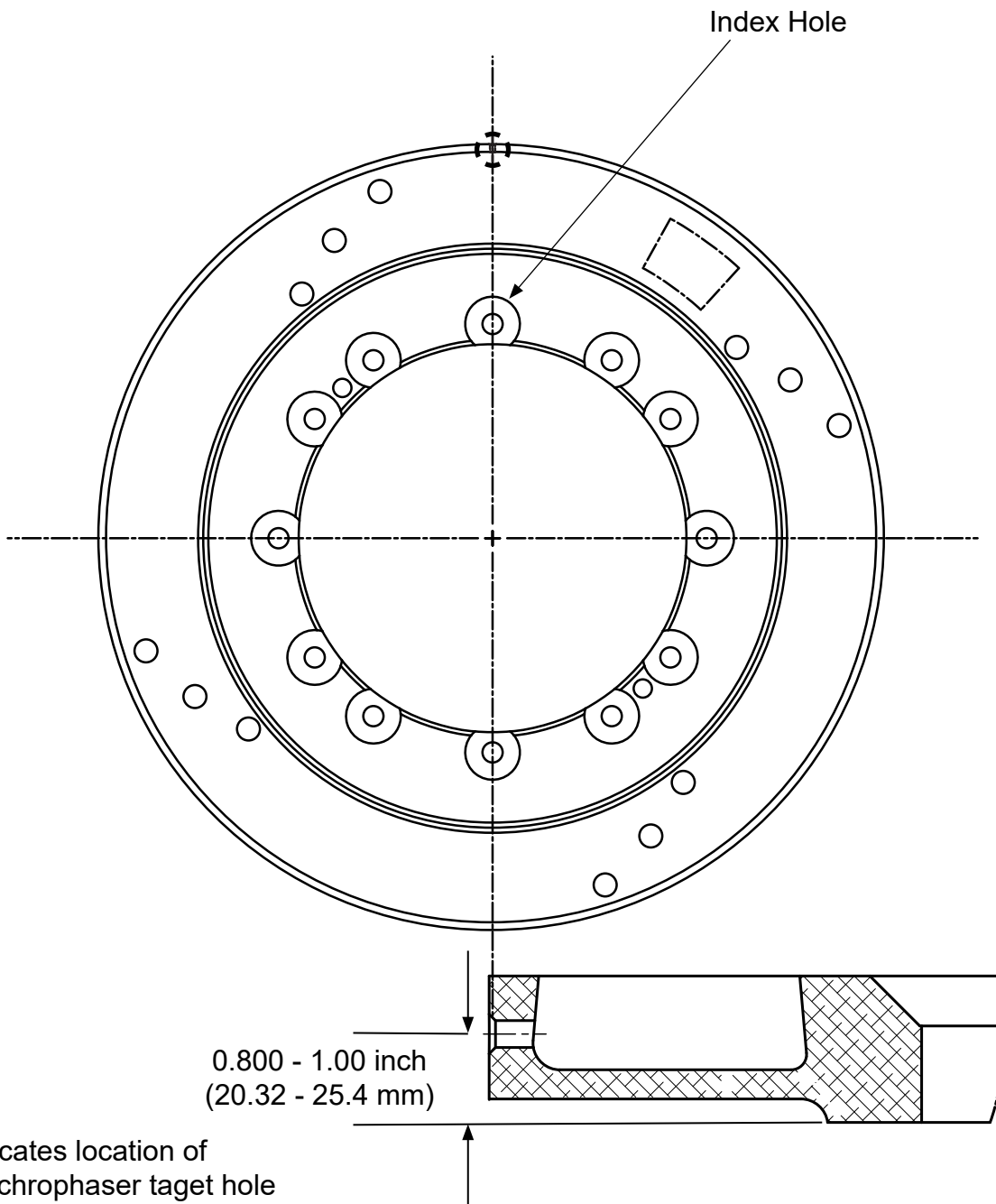
- (b) Stamping "MOD" on a slip ring assembly when the synchrophaser target is removed is not required. Refer to Table 6-4 for the slip ring assembly alternates.



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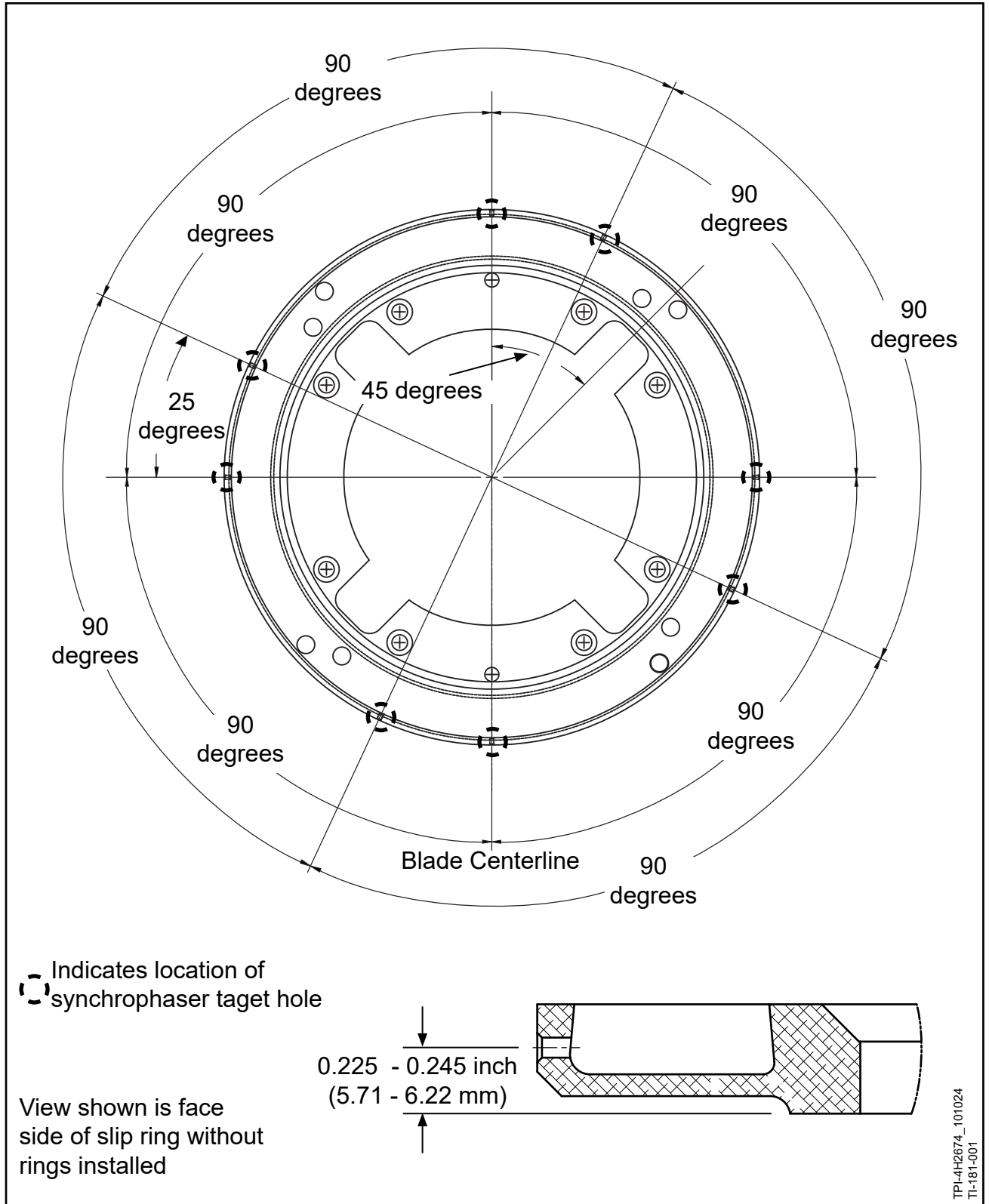
**4(E,H)1555-( ) MOD  
Slip Ring Assembly Modification Instructions  
Figure 6-10**



TPL-181-004-4H1964  
TPL-4H1964\_101024

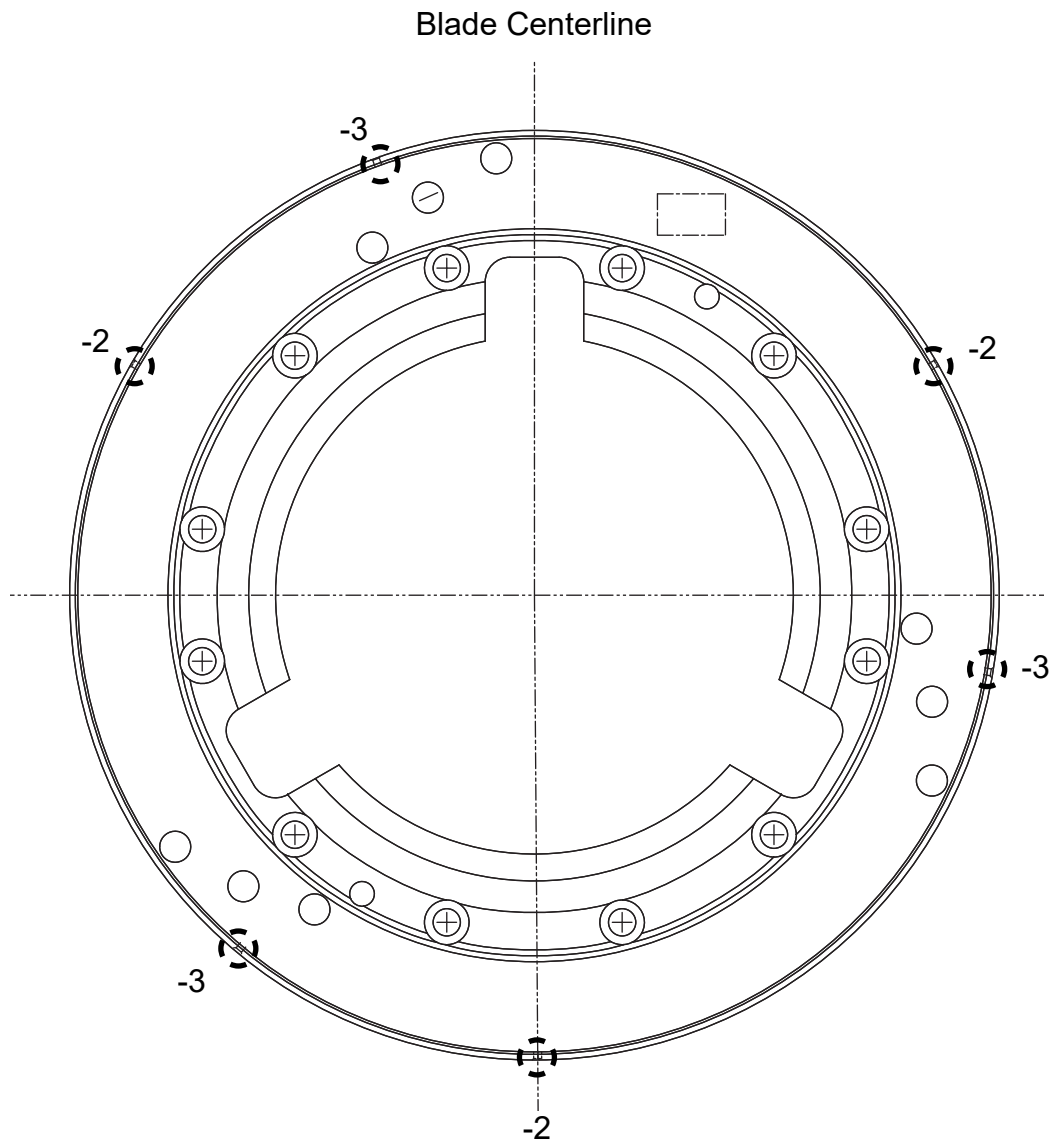
**4(E,H)1964-2 MOD**  
**Slip Ring Assembly Modification Instructions**  
**Figure 6-11**

**HARTZELL ICE PROTECTION SYSTEM  
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**4(E,H)2674-( ) MOD  
Slip Ring Assembly Modification Instructions  
Figure 6-12**

HARTZELL ICE PROTECTION SYSTEM  
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-2 Location for 4(E,H)1555-2

-3 Location for 4(E,H)1555-3

TP1-4H1555\_MOD (Target)

Target Locations for 4(E,H)1555-2(MOD) and 4(E,H)1555-3(MOD) Slip Ring Assemblies  
Figure 6-13

M. Installation of a Synchrophaser Target

- (1) Install a synchrophaser target.
  - (a) Location for installation of the synchrophaser target
    - 1 Refer to Figure 6-14 for the location of the synchrophaser target for Hartzell Propeller slip ring assemblies 4(E,H)1555-(2,3).
    - 2 The location of the synchrophaser target(s) for other Hartzell Propeller slip ring assemblies is specified in the aircraft TC or STC holder's ICA.
  - (b) For Hartzell Propeller slip ring assemblies use the synchrophaser target 2H1377.
  - (c) Apply adhesive CM74 on the threads of the synchrophaser target.
  - (d) Install the synchrophaser target in the slip ring assembly. The synchrophaser target must sit firmly against the slip ring assembly after installation.
  - (e) Tighten the synchrophaser target until snug.
  - (f) Permit adhesive CM74 to dry before flight.

N. Fitting Installation for Slinger Ring p/n 107636

**CAUTION:** DO NOT REMOVE THE FITTINGS FROM THE 107636 SLINGER RING ASSEMBLY UNLESS SPECIFIED IN THE COMPONENT INSPECTION CRITERIA.

- (1) Fitting installation is a factory only repair.
  - (a) Contact the Hartzell Propeller Product Support Department for instructions to return the slinger ring to Hartzell for fitting installation.

**HARTZELL ICE PROTECTION SYSTEM  
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**HARTZELL ICE PROTECTION SYSTEM  
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1. Ice Protection Assembly and Installation

A. General

- (1) For installation instructions, illustrations, and parts lists for Hartzell Propeller ice protection systems, refer to the applicable chapter in this manual:
  - (a) De-ice Kit Installation and Parts chapter
  - (b) Anti-icing Kit Installation and Parts chapter
- (2) Information provided in this chapter is for initial installation of an ice protection system. The instructions provided may not be applicable for replacement of components or installation of conversion kits. Installation instruction for systems or components not supplied by Hartzell Propeller LLC must be obtained from the aircraft TC or STC holder's ICA.
- (3) Ice protection system installation affects the weight and balance of the propeller. Refer to the aircraft TC or STC holder's ICA for specific weight and balance information or calculate before proceeding.
- (4) General information about component modification/removal necessary to install ice protection system components is provided. Refer to the Check chapter or the Repair/Modification chapter of this manual, or the aircraft TC or STC holder's ICA for specific details.

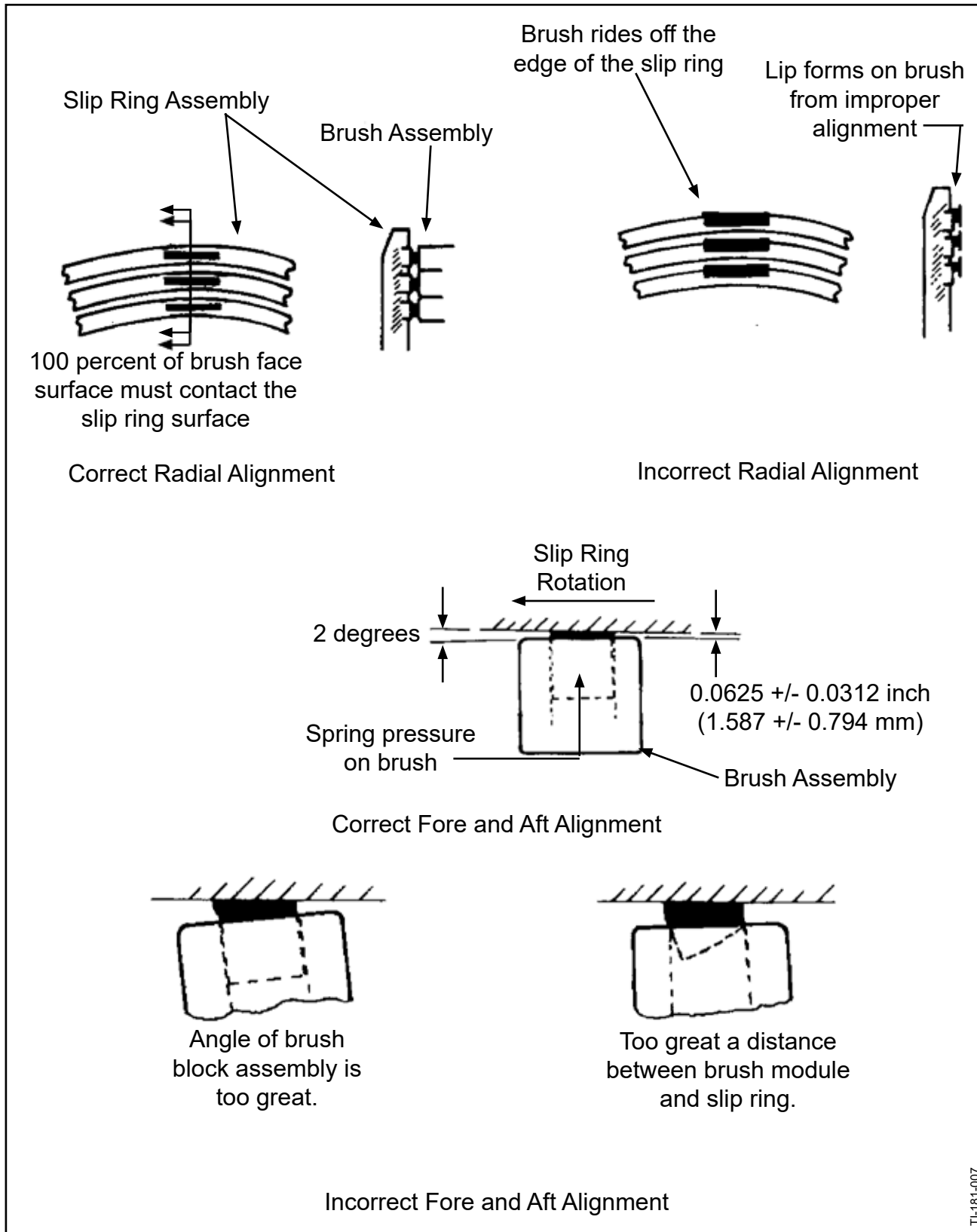
B. De-ice/Anti-icing Boot Installation

- (1) Install a de-ice or anti-icing boot in accordance with the applicable chapter in this manual:
  - (a) De-ice Boot Removal/Installation chapter
  - (b) Anti-icing Boot Removal/Installation chapter

C. Brush Alignment to Slip Ring

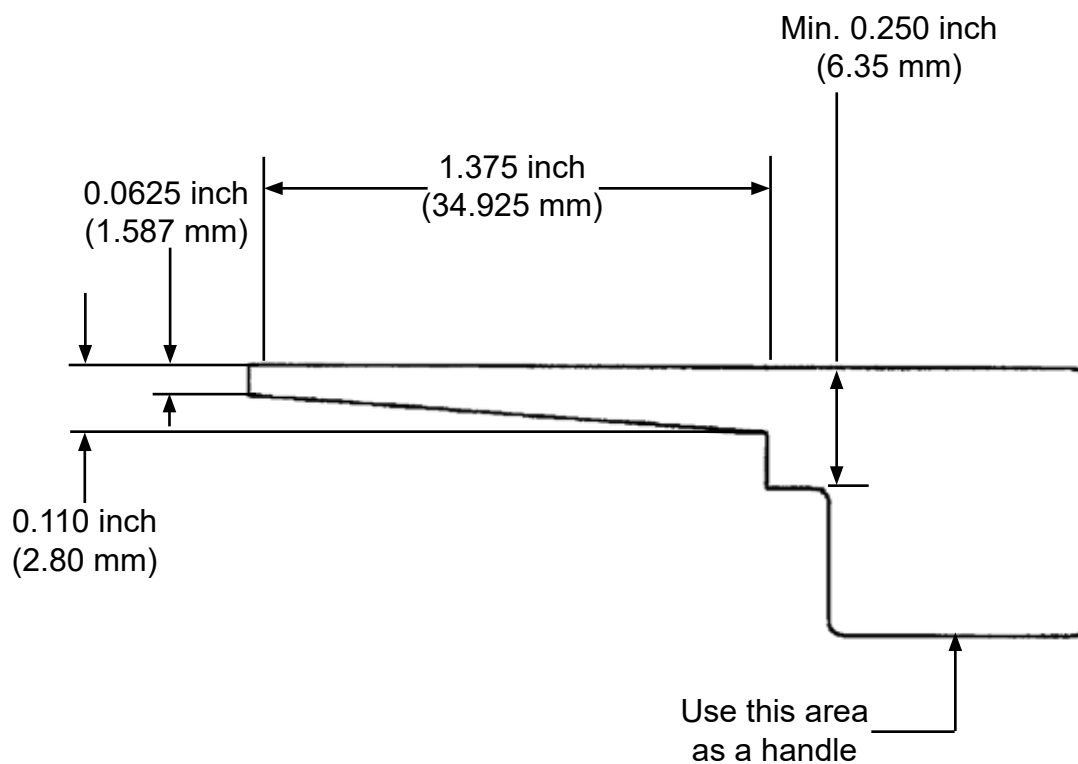
- (1) Reconnect the aircraft wire harness, matching the A, B, C, terminals.  
NOTE: Make sure that adjacent ring terminals do not touch.
- (2) Install the assembly on the aircraft in accordance with the TC or STC holder's ICA.
- (3) Radial alignment of the modular brush assembly to the slip assembly (1140) is important to de-ice system operation.
- (4) The full face surface of the brushes must contact the rings of the slip ring assembly throughout the complete 360 degrees of slip ring rotation.
- (5) Angular fore and aft alignment prevents side loading and premature wear of the brushes and brush modules. Figure 7-1 illustrates the correct and incorrect alignment.

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**Brush Alignment to Slip Ring Assembly  
Figure 7-1**

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TI-181-006

Brush Alignment Template  
Figure 7-2

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- (6) To facilitate alignment a template can be devised. Refer to Figure 7-2. Only the critical dimensions are shown. This area can be fabricated to the shape and dimensions desired for ease of use.
- (7) Adjust the brush projection and angle by holding the brushes in the desired location while tightening the self locking nut. Slotted holes are provided for this purpose.
- (8) The brush projection must be such that the distance between the brush block and the slip ring is 0.0312 to 0.0937 inch (0.794 - 2.38 mm). Refer to Figure 7-1.

NOTE: Do not permit the the brush assembly to become mis-aligned.

- (9) Face alignment of the brushes is accomplished by inserting shims between the brush block and the bracket to obtain proper radial alignment.
- (10) The shims are made of 0.003 inch (0.0762 mm) thick layers of metal laminated together to obtain an overall thickness of approximately 0.020 inch (0.508 mm).

NOTE: Shims may be manufactured locally, if desired.

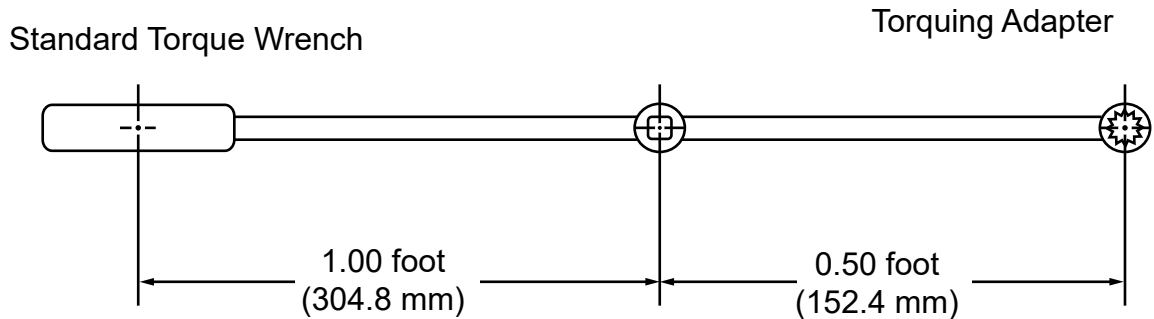
FITS AND CLEARANCES - CONTENTS

1. Torque Values ..... 8-4

LIST OF ILLUSTRATIONS

Calculating Torque When Using a Torque Wrench Adaptor .... Figure 8-1..... 8-3

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

EXAMPLE:

$$\frac{100 \text{ Ft-Lb (136 N}\cdot\text{m)} \times 1 \text{ ft (304.8 mm)}}{1 \text{ ft (304.8 mm)} + 0.50 \text{ ft (152.4 mm)}} = 66.7 \text{ Ft-Lb (90.4 N}\cdot\text{m)}$$

reading on torque wrench with 6-inch (152.4 mm) adapter for actual torque of 100 Ft-Lb (136 N•m)

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

APS212

Calculating Torque When Using a Torque Wrench Adapter  
Figure 8-1

## 1. Torque Values

**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. 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) The torque values for de-ice/anti-icing hardware are specified in the installation procedure for the applicable de-ice/anti-icing kit.
- (4) When an adapter is used with a torque wrench, use the equation in Figure 8-1 to determine the correct torque value.



SPECIAL TOOLS, FIXTURES, AND EQUIPMENT - CONTENTS

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    B. Special Tooling .....9-3

    C. Facilities .....9-3

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1. Tooling and Facility Requirements

A. Standard Tooling

- (1) Repair stations approved to inspect and install Hartzell Propeller ice protection systems are expected to possess appropriate fixtures and tools for inspection and repair.
  - (a) Except as specifically required in this manual, locally fabricated tooling is acceptable for most repair and inspection operations.

B. Special Tooling

- (1) Special tooling may be required for procedures in this manual. For further tooling information, refer to Hartzell Propeller Illustrated Tool and Equipment Manual 165A (61-00-65).
  - (a) Tooling reference numbers appear with the prefix “TE” directly following the tool name to which they apply. For example, a template that is reference number 133 will appear as: template TE133.
  - (b) It is the responsibility of the repair station or the technician performing the repair or servicing to use these special tools as required.

C. Facilities

- (1) Grinding, plating, and painting of propeller components can create health and safety hazards beyond that of other areas of a typical workshop.
  - (a) Areas where grinding, plating, and painting are performed should comply with governmental regulations for occupational safety and health, industry standards, and environmental regulations.
- (2) Workshop areas need to be segregated to prevent contamination.
  - (a) Separate areas should be designated for cleaning, inspection, painting, plating, and assembly.
  - (b) Propeller balancing must be performed in a draft free area.

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**ANTI-ICE KIT INSTALLATION and PARTS - CONTENTS**

**NOTE:** Each section includes the installation instructions and parts list(s) for the applicable anti-ice kit(s).

<b><u>Anti-ice Kit Part Number:</u></b>	<b><u>Section/Page</u></b>
7931-08151-25.....	10A-1
7931-12751-38.....	10B-1
A-2374.....	10C-1
A-2374-1 .....	10C-1
A-2386.....	10C-1
A-2386-1 .....	10C-1
A-2537.....	10T-1
A-2587.....	10T-1
A-2588.....	10T-1
C-4686 .....	10D-1
D-4695-1 .....	10D-1
D-6774 .....	10E-1
102679-1 .....	10F-1
102679-2.....	10G-1
102999-1 .....	10H-1
102999-2.....	10H-1
103313 .....	10I-1
103682 .....	10J-1
103726 .....	10K-1
105014 .....	10L-1
105395 .....	10K-1
107016 .....	10M-1
107122 .....	10P-1
107458 .....	10N-1
107638 .....	10O-1
107988 .....	10P-1
108415 .....	10Q-1
108279 .....	10R-1
109056 .....	10S-1

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ANTI-ICE KIT INSTALLATION and PARTS - CONTENTS, continued

<u>Appendix:</u>	<u>Section/Page</u>
1. Anti-ice Overhaul Kits .....	App-1

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This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**7931-08151-25**

**A.    Installation Instruction 10A**

- (1) If applicable, remove the bulkhead from the propeller.
- (2) Using the fluid feed bolts (5100), bonded seals (5140), O-rings (5150), and spacers (5130) secure the slinger ring assembly (5000) to the bulkhead. Refer to Figure 10A-1.
- (3) Secure the screws (5240), washers (5230), and lock nuts (5250) to the bulkhead. Refer to Figure 10A-1.
- (4) Secure the backnut (5180) to the bulkhead and safety to the screws (5240). Refer to Figure 10A-1.
- (5) Install the bulkhead to the propeller in accordance with the applicable Hartzell Propeller owner's manual.
- (6) Remove the existing hub clamping bolt, nut, and washers from the second bolt hole counterclockwise from the blade leading edge.
- (7) Using the nuts (5190), secure the feed tubes (5010) to the feed bolts (5100).
- (8) Install the feed tube (5010) using the P-clip (5090) and the previously installed hub clamping bolt, washers (5040), and nut (5050), in accordance with Figure 10A-2.
- (9) Tighten the nut (5050) until snug, but do not torque at this time.
- (10) Move the blade to the position specified in Figure 10A-3 for the applicable de-ice kit.
- (11) Align the opening of the feed tube (5010) with the second rib from the edge of the anti-icing boot on the camber side of the blade.
  - (a) Adjust the gap between the opening of the feed tube (5010) and the blade in accordance with the measurement specified in Figure 10A-3 for the applicable de-ice kit.
- (12) Repeat steps (6) through (11) for all feed tubes (5010).

**CAUTION:**    DO NOT PERMIT THE FEED TUBE (5010) TO CONTACT THE SPINNER DOME BLADE CUTOUT.

- (13) Put the spinner dome on the bulkhead and align the attaching holes.
  - (a) Make sure there is clearance between the feed tube (5010) and the spinner dome blade cutout.
- (14) Make adjustments to the position of the feed tube (5010) as necessary.

**HARTZELL ICE PROTECTION SYSTEM  
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This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**7931-08151-25**

**A. Installation Instruction 10A - continued**

(15) Remove the spinner dome.

**CAUTION:** THE FEED TUBE (5010) MAY ROTATE DURING THE TORQUE PROCESS.

(16) Torque the hub clamping bolt that attaches the feed tube (5010) to 20-22 Ft-Lbs (27-29 N•m).

(a) Examine the alignment of the feed tube (5010) after torquing the hub clamping bolt.

(17) After installation of the propeller on the aircraft and installation of the spinner dome:

(a) Make sure that there is clearance between the feed tube (5010) and the spinner dome blade cutout.

(b) Make sure that the feed tube (5010) aligns with the second rib from the edge of the anti-icing boot on the camber side of the blade.

(c) Examine the gap between the feed tube (5010) and the blade in accordance with the measurement specified in Figure 10A-3 for the applicable de-ice kit.

(18) If the clearance between the feed tube (5010) and the spinner dome, the alignment of the feed tube, or the gap between the feed tube and anti-icing boot do not meet the dimensions specified:

(a) Remove the propeller from the aircraft.

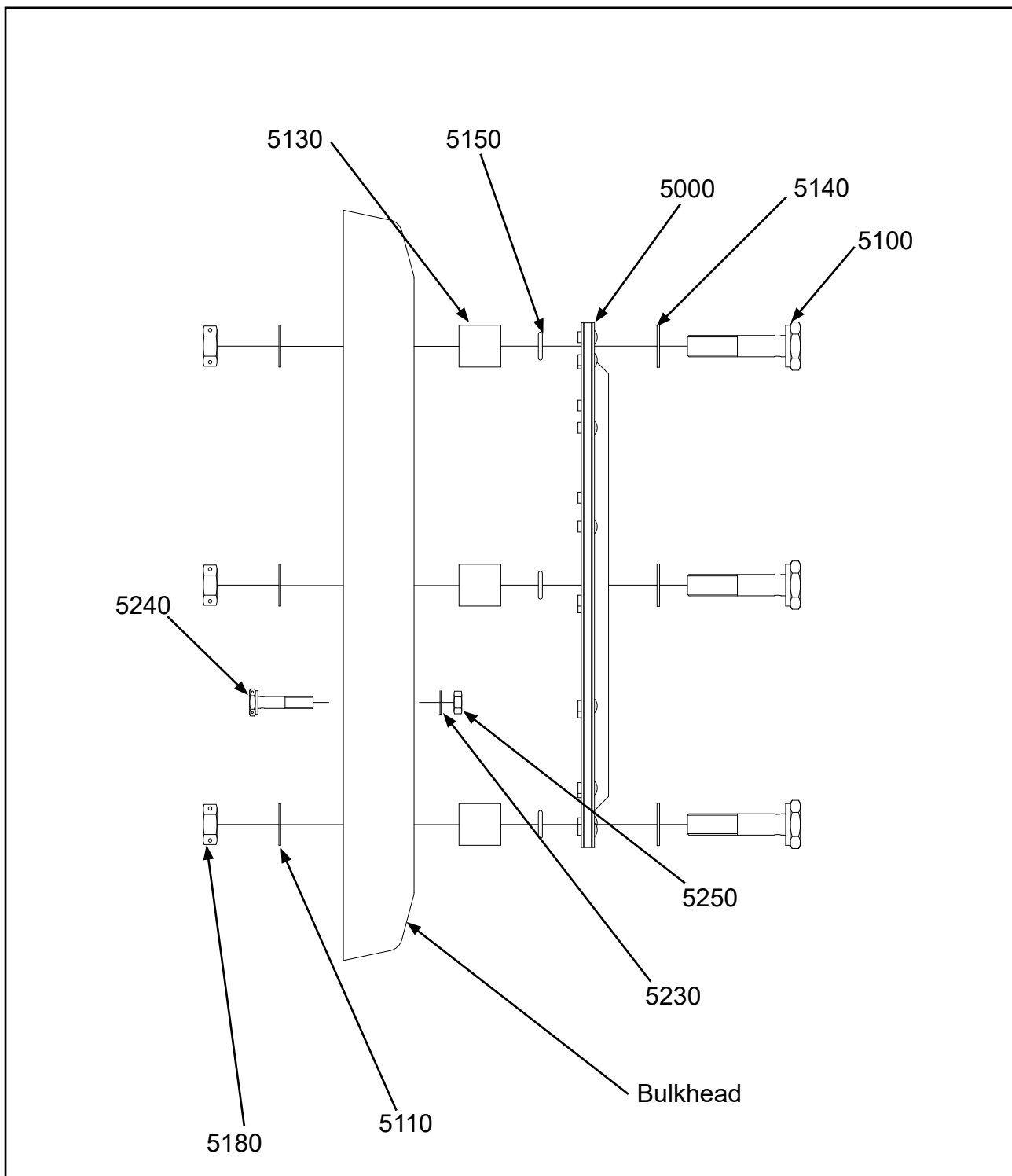
(b) Repeat the feed tube (5010) adjustment in accordance with the instructions provided in this section.



**HARTZELL ICE PROTECTION SYSTEM  
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This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

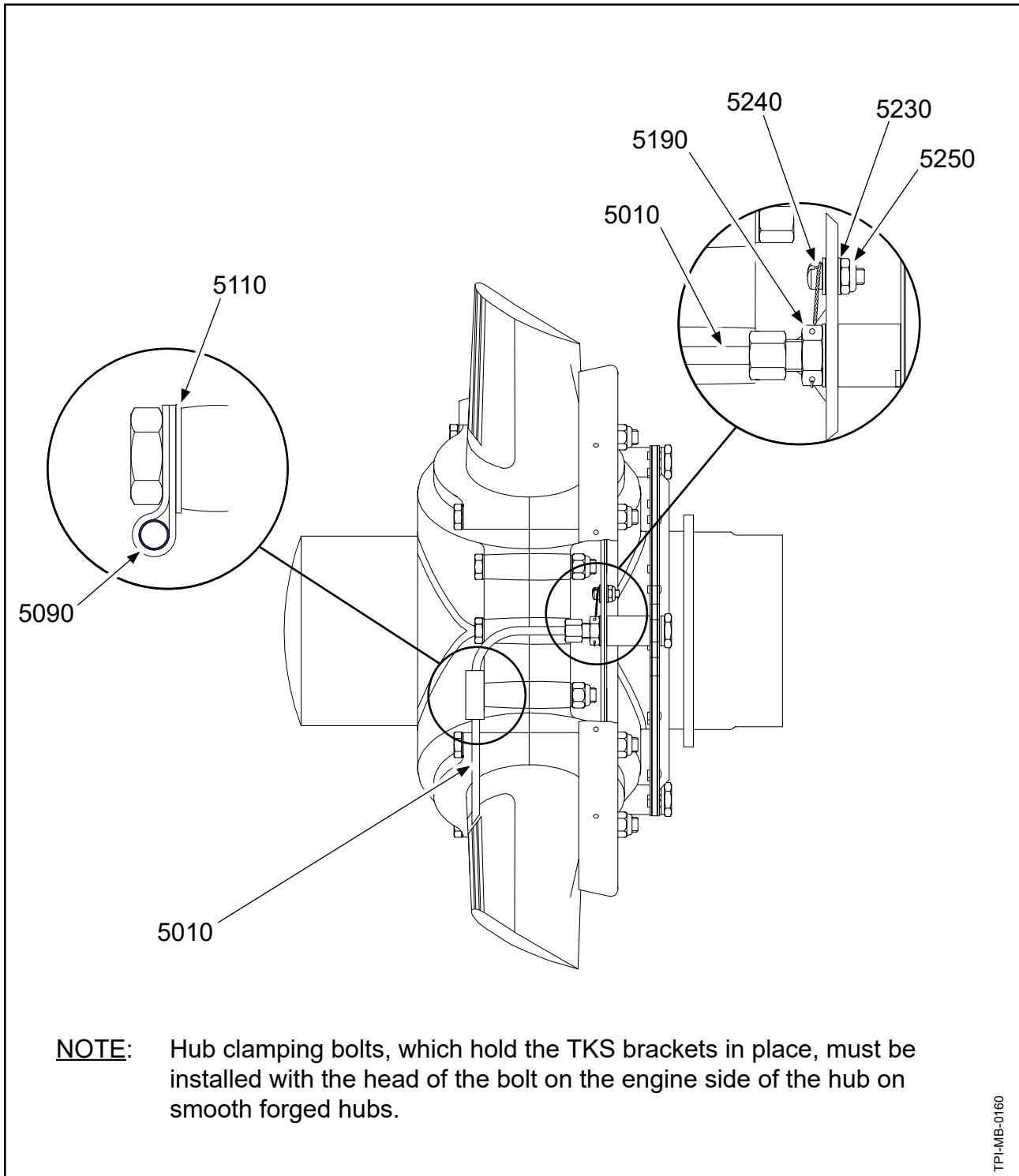
**7931-08151-25**



**Anti-ice Installation  
Figure 10A-1**

**HARTZELL ICE PROTECTION SYSTEM  
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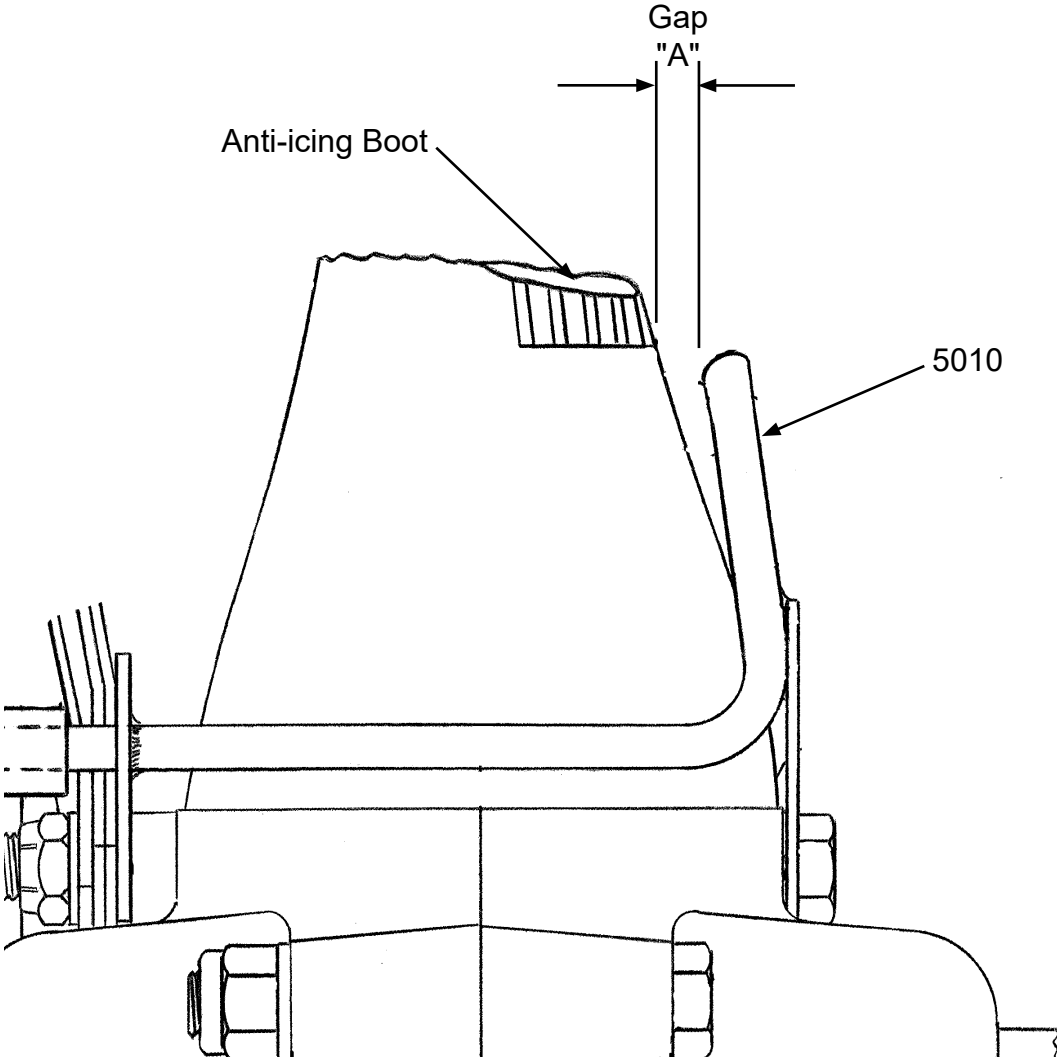
This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**7931-08151-25**



**Anti-ice Installation  
Figure 10A-2**

**HARTZELL ICE PROTECTION SYSTEM  
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This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**7931-08151-25**



Kit Part Number	Blade Postion	Gap "A"
7931-08151-25	Low angle	0.25 inch

**Anti-ice Installation  
Figure 10A-3**

**HARTZELL ICE PROTECTION SYSTEM  
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This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**7931-08151-25**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-08151-25</b>	<b>ANTI-ICE KIT INSTALLATION INSTRUCTION 10A FIGURES: 10A-1 thru 10A-3</b>		
5000	7931-11825-21	• SLINGER RING ASSEMBLY	1	
5010	7931-11825-34	• FEED TUBE, PROP BLADE	3	
5090	7931-4587-03	• P-CLIP	3	
5100	7931-11825-04	• BOLT, FLUID FEED, SLINGER RING	3	
5110	B-3837-0663	• WASHER, CORROSION RESISTANT	3	
5130	7931-11825-05	• STANDOFF, SLINGER RING	3	
5140	7931-11825-07	• BONDED SEAL	3	Y
5150	7931-1000128810	• O-RING	3	
5190	7931-ZN4856	• NUT	3	
5180	7931-ZN6079	• BACKNUT	3	
5230	B-3851-0363	• WASHER	3	Y
5240	B-3840-8	• SCREW, 10-32, FILLISTER HEAD	3	Y
5250	B-3886-3	• NUT, HEX, SELF-LOCKING	3	

- ITEM NOT ILLUSTRATED

**Anti-ice Kit: 7931-08151-25**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**7931-12751-38**

**B. Installation Instruction 10B**

- (1) If applicable, remove the bulkhead from the propeller.
- (2) Using the fluid feed bolts (5100), bonded seals (5140), O-rings (5150), and spacers (5130) secure the slinger ring assembly (5000) to the bulkhead. Refer to Figure 10B-1.
- (3) Secure the screws (5240), washers (5230, and lock nuts (5250) to the bulkhead. Refer to Figure 10B-2.
- (4) Secure the backnut (5180) to the bulkhead and safety to the screws (5240). Refer to Figure 10B-2.
- (5) Install the bulkhead to the propeller in accordance with the applicable Hartzell Propeller owner's manual.
- (6) Remove the existing hub clamping bolt, nut, and washers from the second bolt hole counterclockwise from the blade leading edge.
- (7) Using the nuts (5190), secure the feed tubes (5010) to the feed bolts (5100).
- (8) Install the feed tube (5010) using the P-clip (5090) and the previously installed hub clamping bolt, washers, and nut, in accordance with Figure 10B-2.
- (9) Tighten the nut until snug, but do not torque at this time.
- (10) Move the blade to the position specified in Figure 10B-3 for the applicable de-ice kit.
- (11) Align the opening of the feed tube (5010) with the second rib from the edge of the anti-icing boot on the camber side of the blade.
  - (a) Adjust the gap between the opening of the feed tube (5010) and the blade in accordance with the measurement specified in Figure 10B-3 for the applicable de-ice kit.
- (12) Repeat steps(6) through(11) for all feed tubes (5010).

**CAUTION:** DO NOT PERMIT THE FEED TUBE (5010) TO CONTACT THE SPINNER DOME BLADE CUTOUT.

- (13) Put the spinner dome on the bulkhead and align the attaching holes.
  - (a) Make sure that there is clearance between the feed tube (5010) and the spinner dome blade cutout.
- (14) Make adjustments to the position of the feed tube (5010) as necessary.
- (15) Remove the spinner dome.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**7931-12751-38**

**B. Installation Instruction 10B -continued**

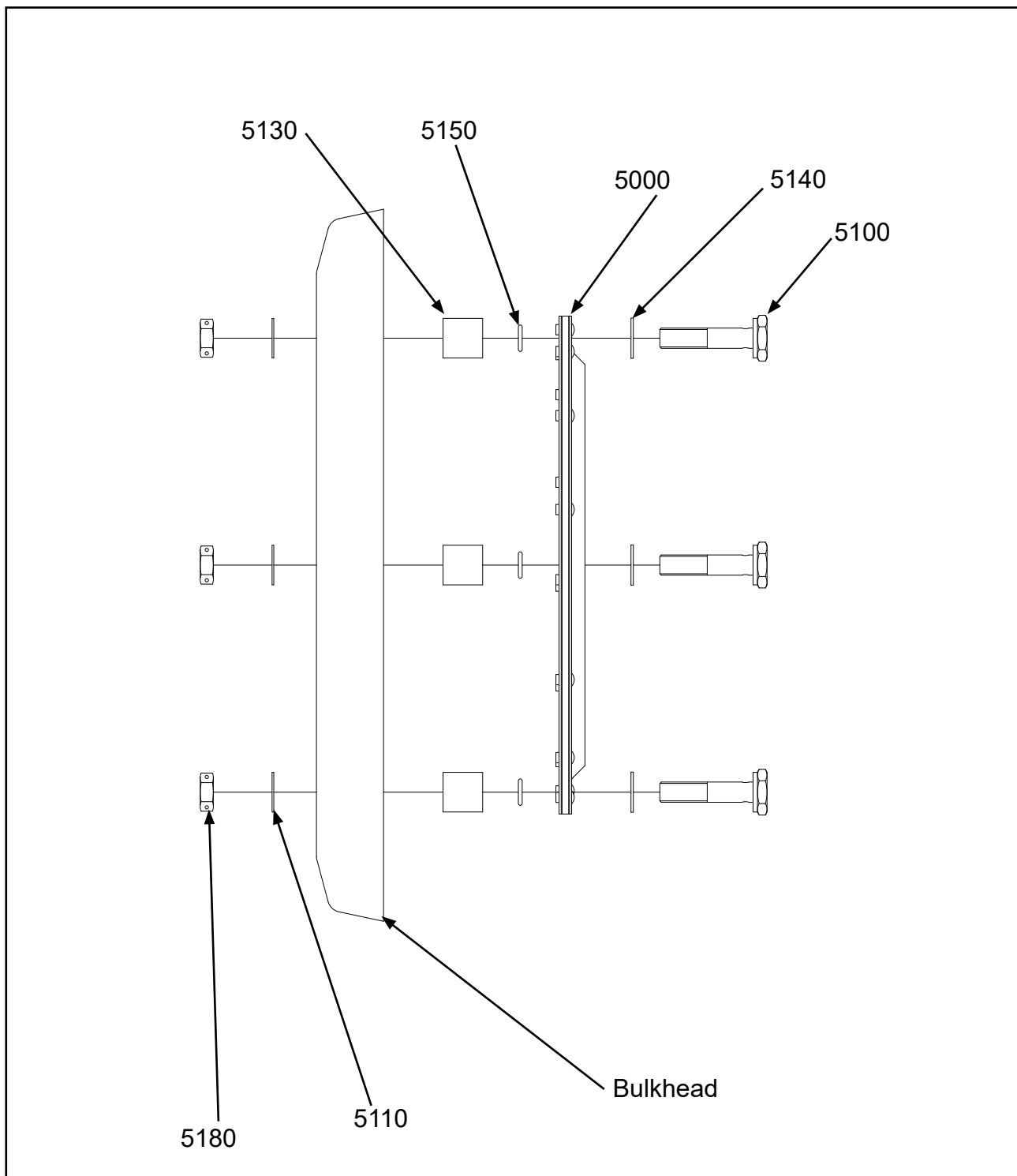
**CAUTION:** THE FEED TUBE (5010) MAY ROTATE DURING THE TORQUE PROCESS.

- (16) Torque the hub clamping bolt that is securing the feed tube (5010) to 20-22 Ft-Lbs (27-29 N•m).
  - (a) Examine the alignment of the feed tube (5010) after torquing the hub clamping bolt.
- (17) After installation of the propeller on the aircraft and installation of the spinner dome:
  - (a) Make sure that there is clearance between the feed tube (5010) and the spinner dome blade cutout.
  - (b) Make sure that the feed tube (5010) aligns with the second rib from the edge of the anti-icing boot on the camber side of the blade.
  - (c) Examine the gap between the feed tube (5010) and the blade in accordance with the measurement specified in Figure 10B-3 for the applicable de-ice kit.
- (18) If the clearance between the feed tube (5010) and the spinner dome, the alignment of the feed tube, or the gap between the feed tube and anti-icing boot do not meet the dimensions specified:
  - (a) Remove the propeller from the aircraft.
  - (b) Repeat the feed tube (5010) adjustment in accordance with the instructions provided in this section.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

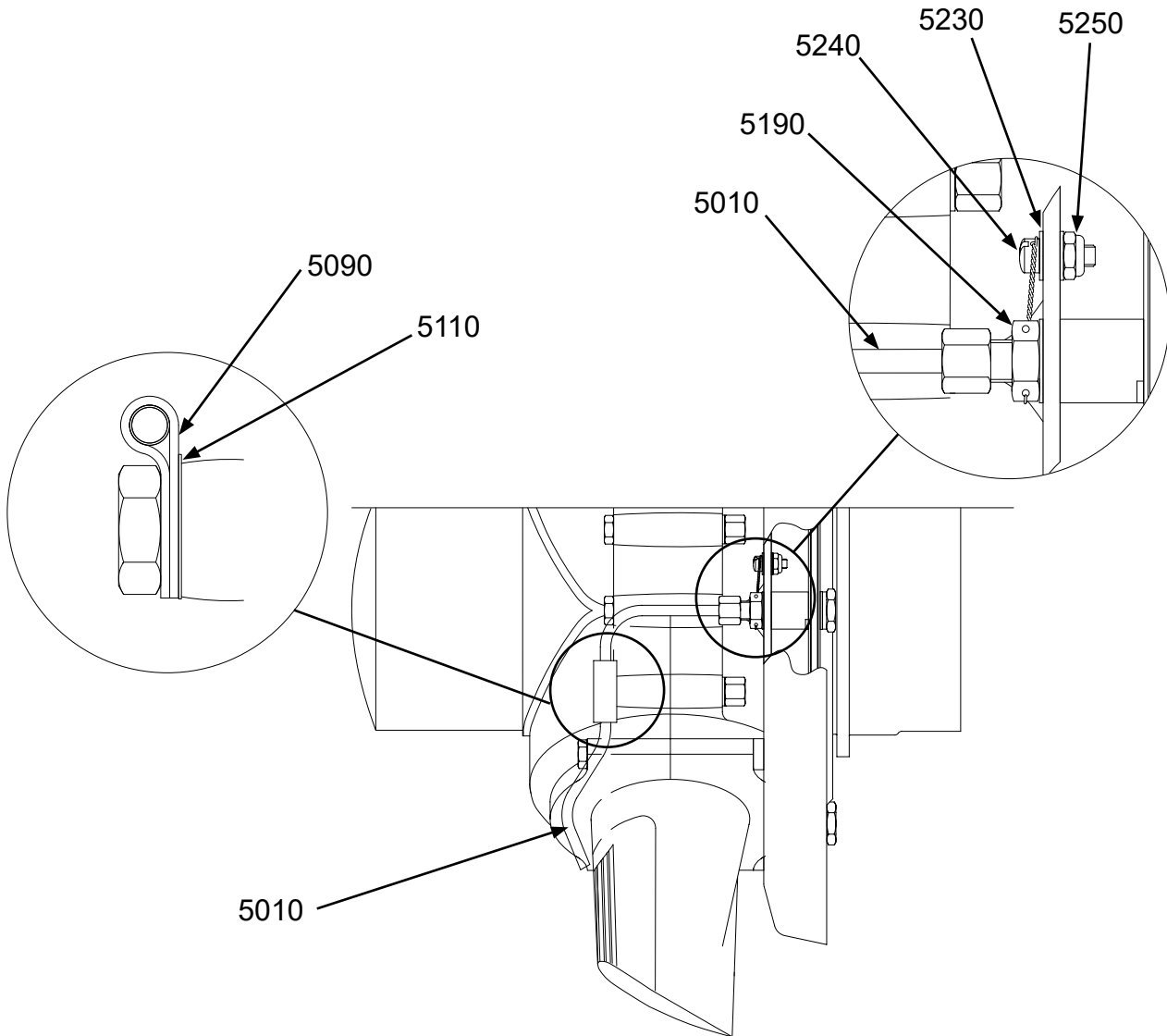
**7931-12751-38**



**Anti-ice Installation  
Figure 10B-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**7931-12751-38**



**NOTE:** When used on a smooth forged hub manufactured by Hartzell Propeller LLC, clearance for the TKS brackets may not be sufficient. The hub clamping bolts, which hold the TKS brackets in place, may be installed with the head of the bolt on the engine side of the hub.

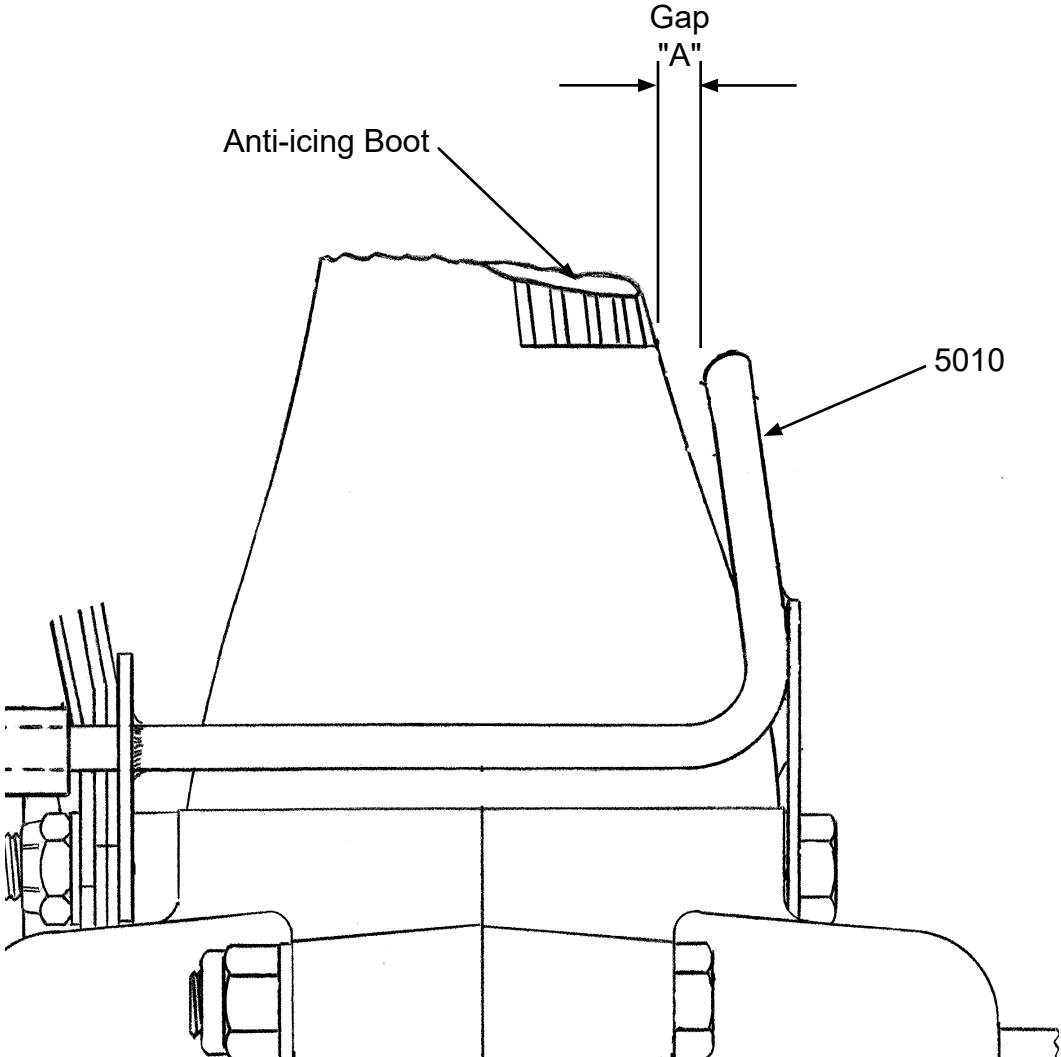
TPI-MB-0159

**Anti-ice Installation  
Figure 10B-2**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**7931-12751-38**



Kit Part Number	Blade Position	Gap "A"
7931-12751-38	Low angle	0.25 inch

**Anti-ice Installation  
Figure 10B-3**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**7931-12751-38**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-12751-38</b>	<b>ANTI-ICE KIT INSTALLATION INSTRUCTION 10B FIGURES: 10B-1 thru 10B-3</b>		
5000	7931-11825-21	• SLINGER RING ASSEMBLY	1	
5010	7931-12725-10	• FEED TUBE, PROP BLADE	3	
5090	7931-4587-03	• P-CLIP	3	
5100	7931-11702-20	• BOLT, FLUID FEED, SLINGER RING	3	
5110	B-3837-0632	• WASHER, CORROSION RESISTANT	3	
5130	7931-11702-27	• SPACER, SLINGER RING	3	
5140	7931-11825-07	• BONDED SEAL	3	Y
5150	7931-1000128810	• O-RING	3	
5190	7931-ZN4856	• NUT	3	
5180	7931-ZN6079	• BACKNUT	3	
5230	B-3851-0363	• WASHER	3	Y
5240	B-3840-8	• SCREW, 10-32, FILLISTER HEAD	3	Y
5250	B-3886-3	• NUT, HEX, SELF-LOCKING	3	

- ITEM NOT ILLUSTRATED

**Anti-ice Kit: 7931-12751-38**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**A-2374, A-2374-1, A-2386, and A-2386-1**

**C. Installation Instruction 10C**

- (1) If applicable, remove the spinner bulkhead from the propeller hub. The spinner bulkhead may be mounted to the mounting area of the starter ring gear with a bolt, washer, and nut or it may be mounted to the hub through the hub clamping bolt.
- (2) Remove the existing hub clamping bolt, nut, washers, and spacer from the bolt hole at the blade socket that is closest to the leading edge of the blade. Refer to Figure 10C-1.
- (3) Install the travel tube unit (5020), using the previously removed hub clamping bolt, washers, spacer, nut, and bulkhead, if applicable, in accordance with Figure 10C-1.
  - (a) Tighten the nut until snug, but do not torque the hub clamping bolt at this time.
- (4) Move the blade to the position specified in Figure 10C-2 for the applicable de-ice kit.
- (5) Align the opening of the travel tube unit (5020) with the center of the anti-icing boot on the leading edge the blade.
  - (a) Adjust the gap between the opening of the travel tube unit and the blade in accordance with the measurement specified in Figure 10C-2 for the applicable de-ice kit.
- (6) Repeat steps(2) through (5) for all travel tube units.

**CAUTION: THE TRAVEL TUBE UNIT (5020) MUST NOT CONTACT THE SPINNER DOME BLADE CUTOUT.**

- (7) Put the spinner dome on the bulkhead and align the attaching holes.
  - (a) Make sure there is clearance between the travel tube unit (5020) and the spinner dome blade cutout.
- (8) Make adjustments to the position of the travel tube unit (5020) as required.
- (9) Remove the spinner dome.

**CAUTION: THE TRAVEL TUBE UNIT (5020) MAY ROTATE DURING THE TORQUE PROCESS.**

- (10) Torque the hub clamping bolt to 20-22 Ft-Lbs (27-29 N•m).
  - (a) Examine the alignment of the travel tube unit (5020) after torquing the hub clamping bolt.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**A-2374, A-2374-1, A-2386, and A-2386-1**

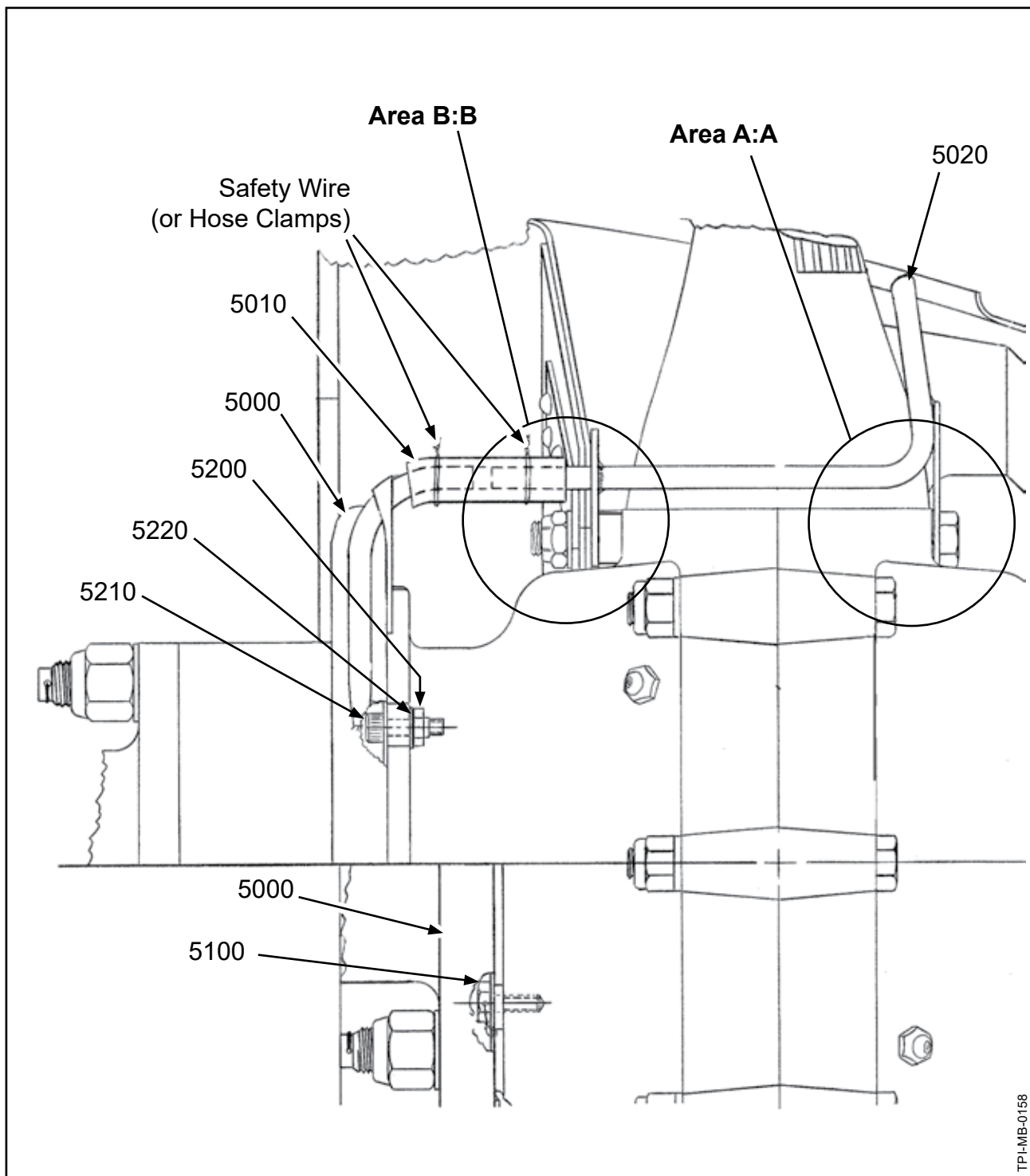
**C. Installation Instruction 10C - continued**

- (11) Using the bolt (5100) or the screw (5210), washer (5220), and nut (5200) attach the slinger ring assembly (5000) to the hub in accordance with Figure 10C-1.
- (12) If applicable, safety the bolt (5100) to the slinger ring assembly in accordance with Figure 10C-1 using 0.032 in (0.81 mm) diameter stainless steel wire.
- (13) Secure the travel tube hose (5010) to the travel tube unit (5020) and the slinger ring assembly (5000) with hose clamps or using 0.032 in (0.81 mm) diameter stainless steel wire in accordance with Figure 10C-1.
- (14) After installation of the propeller on the aircraft and installation of the spinner dome, check for clearance between the travel tubes (5020) and the spinner dome blade cutouts.
  - (a) If any of the travel tubes contact the spinner dome blade cutouts, remove the propeller from the aircraft and adjust the travel tube(s) in accordance with the instructions in this section.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**A-2374, A-2374-1, A-2386, and A-2386-1**

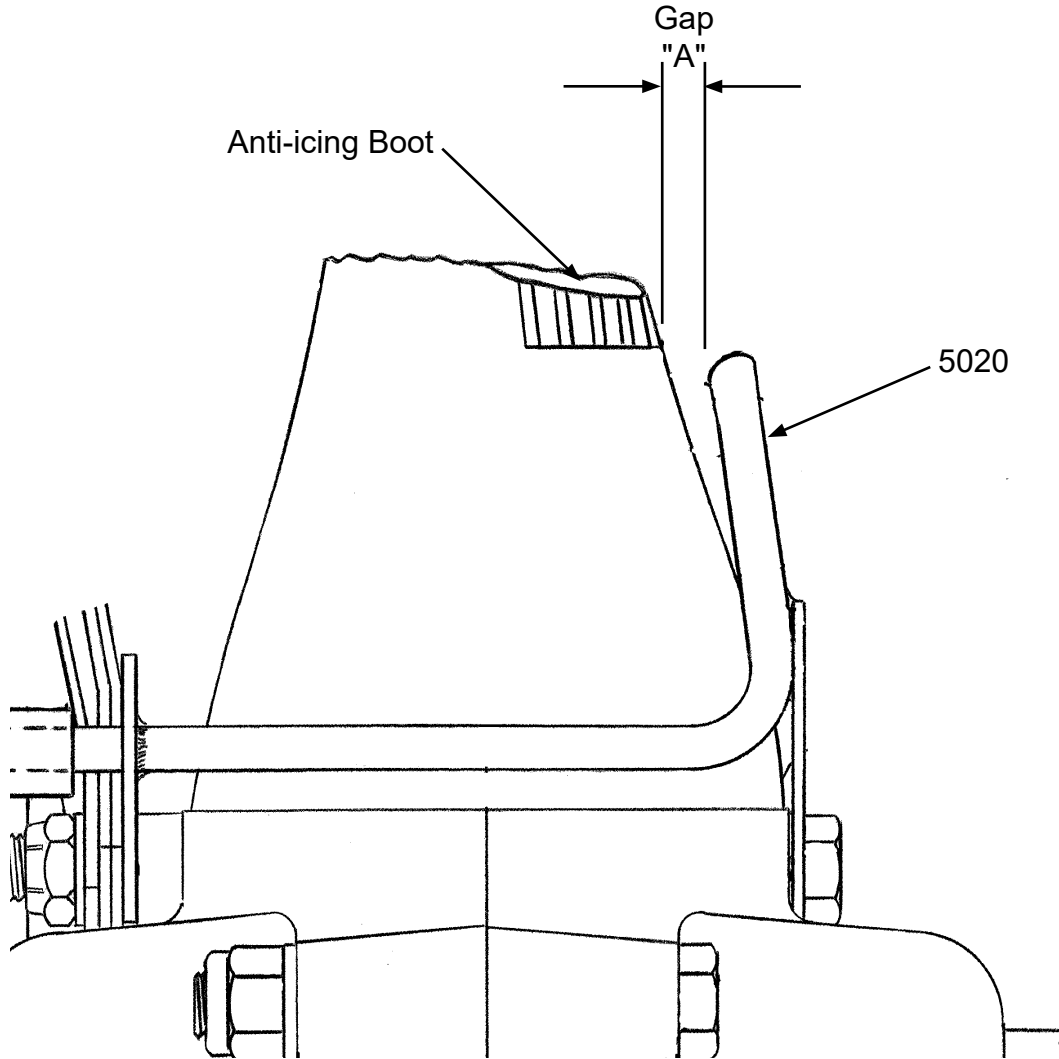


**Anti-ice Installation  
Figure 10C-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**A-2374, A-2374-1, A-2386, and A-2386-1**



Kit Part Number	Blade Position	Gap "A"
A-2374	25° to 30°	0.062 to 0.125 inch
A-2374-1	25° to 30°	0.062 to 0.125 inch
A-2386	25° to 30°	0.062 to 0.125 inch
A-2386-1	25° to 30°	0.062 to 0.125 inch

**Anti-ice Installation  
Figure 10C-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**A-2374, A-2374-1, A-2386, and A-2386-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>A-2374</b>	<b>ANTI-ICE KIT INSTALLATION INSTRUCTION 10C FIGURES: 10C-1 and 10C-2</b>		
5000	C-2458-1	• SLINGER RING UNIT	1	
5010	A-1866-3	• HOSE, TRAVEL TUBE MOUNTING	2	
5020	C-2368	• TRAVEL TUBE UNIT SUPERSEDED BY ITEM 5020A, PRE HC-SL-30-247	2	
5020A	101204	• TRAVEL TUBE UNIT SUPERSEDES ITEM 5020, POST HC-SL-30-247	2	
5100	A-3429-1	• SCREW, 10-32, CAP	4	Y
5200	B-3808-3	• NUT, SELF-LOCKING	4	Y
5220	B-3851-0332	• WASHER	4	Y
	<b>A-2374-1</b>	<b>ANTI-ICE KIT INSTALLATION INSTRUCTION 10C FIGURES: 10C-1 and 10C-2</b>		
5000	C-2458-2	• SLINGER RING UNIT	1	
5010	A-1866-2	• HOSE, TRAVEL TUBE MOUNTING	2	
5020	B-2368-1	• TRAVEL TUBE UNIT SUPERSEDED BY ITEM 5020A, PRE HC-SL-30-247	2	
5020A	101204-2	• TRAVEL TUBE UNIT SUPERSEDES ITEM 5020, POST HC-SL-30-247	2	
5100	A-2016-2	• BOLT, 10-32, HEX HEAD	4	Y
5100A	B-3720	• BOLT, 10-7.232, HEX HEAD (ALTERNATE FOR ITEM 5100)	4	Y

- ITEM NOT ILLUSTRATED

**Anti-ice Kits: A-2374 and A-2374-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**A-2374, A-2374-1, A-2386, and A-2386-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>A-2386</b>	<b>ANTI-ICE KIT (BEECH 55&amp;58) INSTALLATION INSTRUCTIONS 10C FIGURES: 10C-1 and 10C-2</b>		
5000	C-2371	• SLINGER RING UNIT	1	
5010	A-1866-3	• HOSE, TRAVEL TUBE MOUNTING	3	
5020	B-2368-1	• TRAVEL TUBE UNIT SUPERSEDED BY ITEM 5020A, PRE HC-SL-30-247	3	
5020A	101204	• TRAVEL TUBE UNIT SUPERSEDES ITEM 5020, POST HC-SL-30-247	3	
5200	B-3808-4	• NUT, HEX, SELF-LOCKING	6	Y
5210	B-6653-43	• SCREW, 1/4-28, CAP	6	
5220	B-3851-0432	• WASHER	6	Y
	<b>A-2386-1</b>	<b>ANTI-ICE KIT (BEECH 55 &amp; 58) INSTALLATION INSTRUCTIONS 10C FIGURES: 10C-1 and 10C-2</b>		
5000	C-2371-1	• SLINGER RING UNIT	1	
5010	A-1866-2	• HOSE, TRAVEL TUBE MOUNTING	3	
5020	B-2368-1	• TRAVEL TUBE UNIT SUPERSEDED BY ITEM 5020A, PRE HC-SL-30-247	3	
5020A	101204-1	• TRAVEL TUBE UNIT SUPERSEDES ITEM 5020, POST HC-SL-30-247	3	
5100	B-3384-1H	• BOLT, 1/4-28, HEX HEAD	3	Y

- ITEM NOT ILLUSTRATED

**Anti-ice Kits: A-2386 and A-2386-1**



This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**C-4686 and D-4695-1**

**D. Installation Instruction 10D**

- (1) Remove the nut (5050), washers (5040), and hub clamping bolt from the second bolt hole counterclockwise from the blade leading edge.  
Refer to Figure 10D-1.
- (2) Install the travel tube unit (5020) using the previously installed hub clamping bolt, washers (5040), and nut (5050), in accordance with Figure 10D-1.
- (3) Tighten the nut (5050) until snug, but do not torque at this time.
- (4) Move the blade to the position specified in Figure 10D-2 for the applicable de-ice kit.
- (5) Align the opening of the travel tube unit (5020) with the second rib from the edge of the anti-icing boot on the camber side of the blade.
  - (a) Adjust the gap between the opening of the travel tube unit and the blade in accordance with the measurement specified in Figure 10D-2 for the applicable de-ice kit.
- (6) Repeat steps (2) through (5) for all travel tube units.

**CAUTION:** THE TRAVEL TUBE UNIT (5020) MUST NOT CONTACT THE SPINNER DOME BLADE CUTOUT.

- (7) If the bulkhead is not installed, install the bulkhead.
- (8) Install the travel tube hose (5010) through the bulkhead and onto the travel tube unit (5020). Do not secure at this time.
- (9) Using the bolt (5100), washer (5110), spacer (5130), and nut (5120) attach the slinger ring assembly (5000) to the hub in accordance with Figure 10D-1.

**CAUTION:** THE TRAVEL TUBE UNIT (5020) MUST NOT CONTACT THE SPINNER DOME BLADE CUTOUT.

- (10) Put the spinner dome on the bulkhead and align the attaching holes.
  - (a) Make sure that there is clearance between the travel tube unit (5020) and the spinner dome blade cutout.
- (11) Make adjustments to the position of the travel tube unit (5020) as required.
- (12) Remove the spinner dome.

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**C-4686 and D-4695-1**

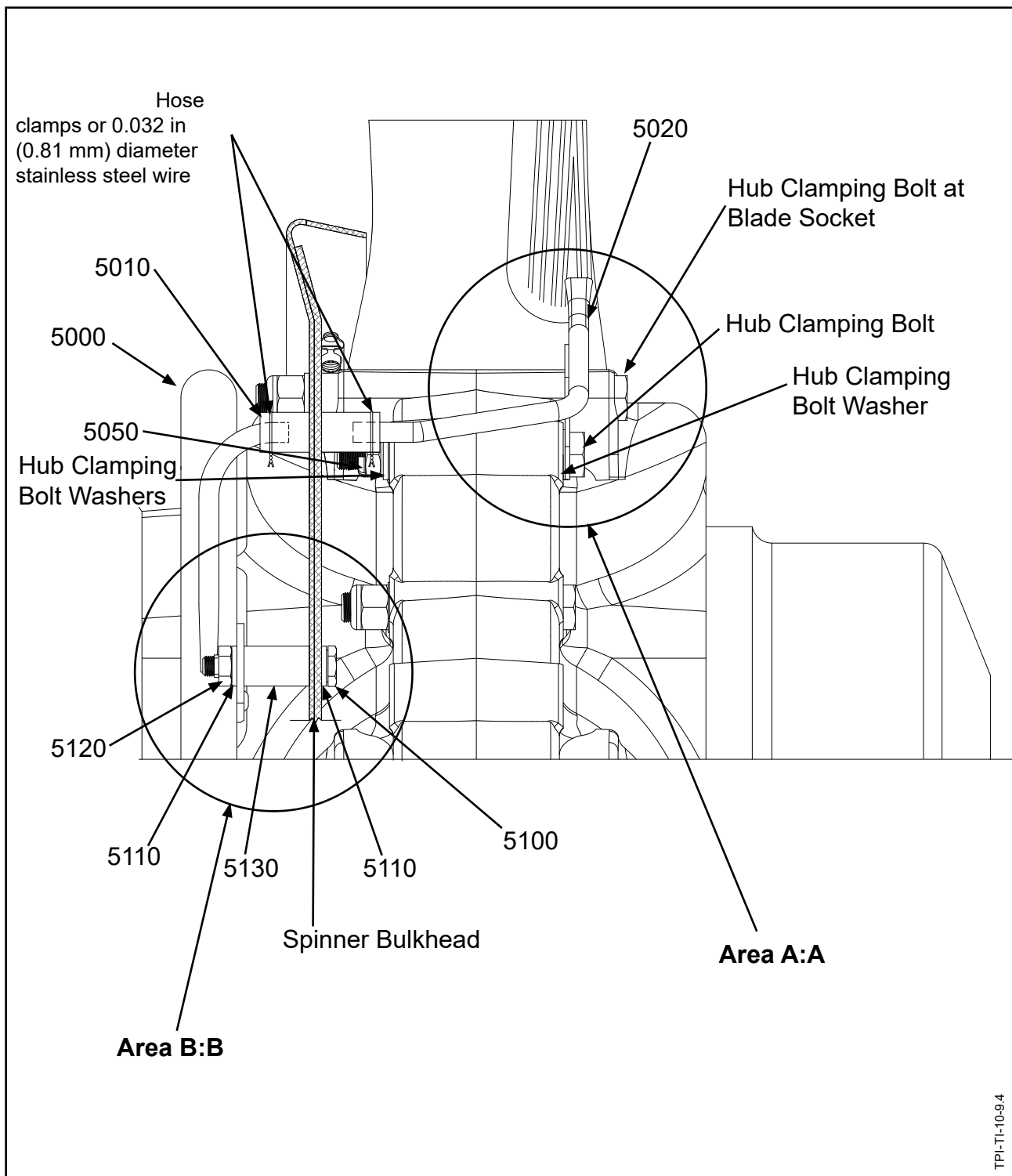
D. Installation Instruction 10D - continued

**CAUTION:** THE TRAVEL TUBE UNIT (5020) MAY ROTATE DURING THE  
TORQUE PROCESS.

- (13) Torque the hub clamping bolt that attaches the travel tube unit (5020) and spinner bulkhead to the hub to 20-22 Ft-Lbs (27-29 N•m).
  - (a) Examine the alignment of the travel tube unit (5020) after torquing the hub clamping bolt.
- (14) Using hose clamps or using 0.032 in (0.81 mm) diameter stainless steel wire (A-6741-131), attach the travel tube hose (5010) to the travel tube unit (5020) and the slinger ring assembly (5000). Refer to Figure 10D-1.
- (15) After installation of the propeller on the aircraft and installation of the spinner dome:
  - (a) Make sure that there is clearance between the travel tube unit (5020) and the spinner dome blade cutout.
  - (b) Make sure that the travel tube (5020) aligns with the second rib from the edge of the anti-icing boot on the camber side of the blade.
  - (c) Examine the gap between the travel tube unit (5020) and the blade in accordance with the measurement specified in Figure 10D-2 for the applicable de-ice kit.
- (16) If the clearance between the travel tube unit (5020) and the spinner dome, the alignment of the travel tube or the gap between the travel tube and anti-icing boot do not meet the dimensions specified:
  - (a) Remove the propeller from the aircraft.
  - (b) Repeat the travel tube unit (5020) adjustment in accordance with the instructions provided in this section.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

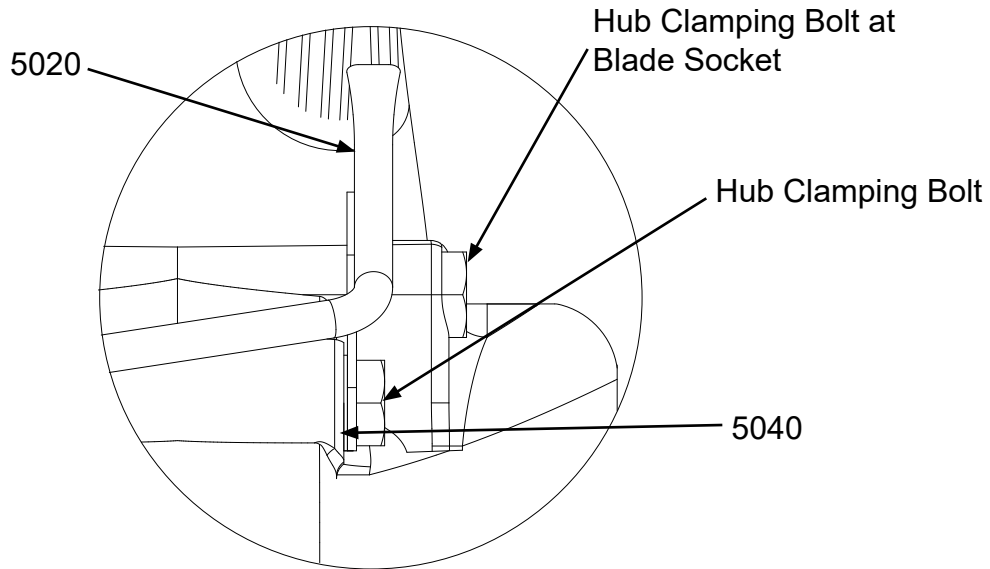
This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**C-4686 and D-4695-1**



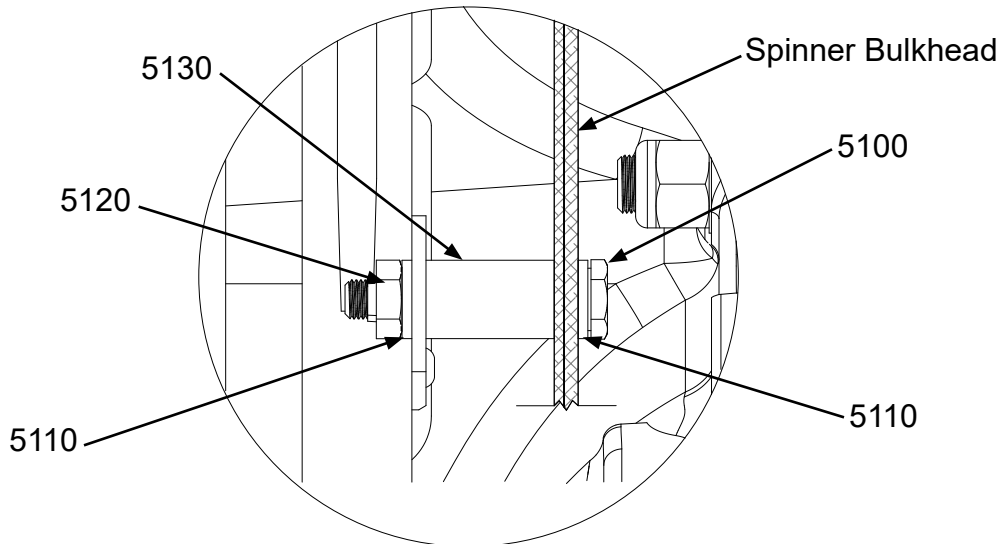
**Anti-ice Installation  
Figure 10D-1, page 1 of 2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**C-4686 and D-4695-1**



**Area A:A**



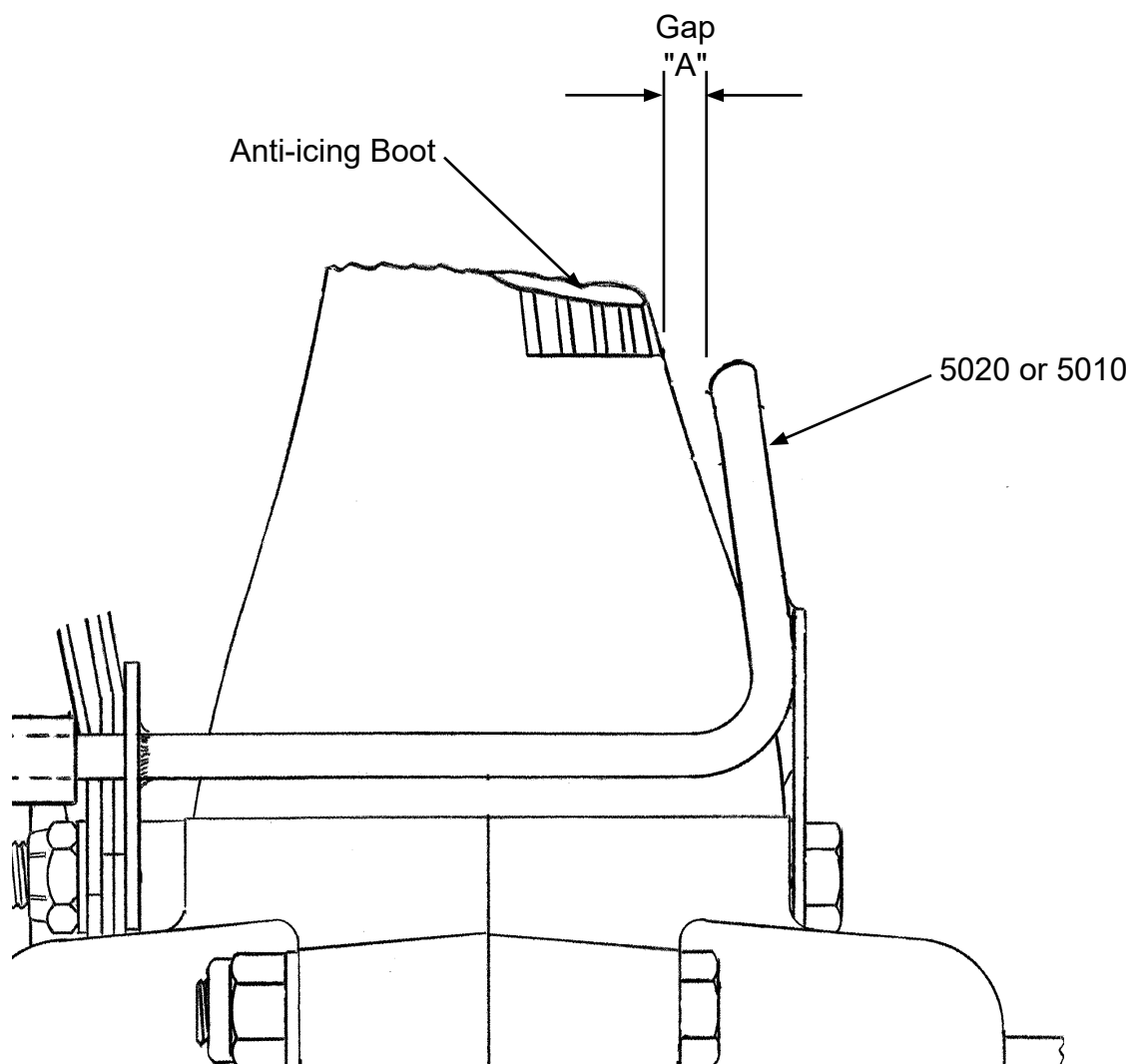
**Area B:B**

**Anti-ice Installation  
Figure 10D-1, page 2 of 2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**C-4686 and D-4695-1**



Kit Part Number	Blade Postion	Gap "A"
C-4686	Low angle	0.06 to 0.12 inch
D-4695-1	Low angle	0.08 to 0.12 inch

**Anti-ice Installation  
Figure 10D-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**C-4686 and D-4695-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>C-4686</b>	<b>ANTI-ICE KIT INSTALLATION INSTRUCTION 10D FIGURES: 10D-1 AND 10D-2</b>		
5000	D-4688	• SLINGER RING UNIT	1	
5010	A-1866-3	• HOSE, TRAVEL TUBE MOUNTING	3	
5020	B-4689	• TRAVEL TUBE UNIT	3	
5040	B-3834-0663	• WASHER	6	Y
5050	B-3599	• NUT, 3/8-24, HEX, SELF-LOCKING	3	Y
5130	A-4692	• SPACER, SLINGER RING	3	
5100	B-3384-17H	• BOLT, 1/4-28, HEX HEAD	3	Y
5110	B-3834-0463	• WASHER	6	
5120	B-3808-4	• NUT, HEX, SELF-LOCKING	3	Y
	<b>D-4695-1</b>	<b>ANTI-ICE-INSTALLATION KIT INSTALLATION INSTRUCTION 10D FIGURES: 10D-1 AND 10D-2</b>		
5000	D-4688	• SLINGER RING UNIT	1	
5010	A-1866-3	• HOSE, TRAVEL TUBE MOUNTING	3	
5020	B-4689	• TRAVEL TUBE UNIT	3	
5040	B-3834-0663	• WASHER	6	Y
5050	B-3599	• NUT, 3/8-24, HEX, SELF-LOCKING	3	Y
5100	B-3384-17H	• BOLT, 1/4-28, HEX HEAD	3	Y
5110	B-3834-0463	• WASHER	6	
5120	B-3808-4	• NUT, HEX, SELF-LOCKING	3	Y
5130	A-4692	• SPACER, SLINGER RING	3	

- ITEM NOT ILLUSTRATED

**Anti-ice Kits: C-4686 and D-4695-1**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**D-6774**

E. Installation Instruction 10E

NOTE: The slinger ring assembly on Lycoming installations are integrated with the starter ring gear.

- (1) If applicable, remove the spinner bulkhead from the propeller hub. The spinner bulkhead may be mounted to the mounting area of the starter ring gear with a bolt, washer, and nut or it may be mounted to the hub through the hub clamping bolt.
- (2) Remove the nut (5085), washers (5080 and/or 5040), spacer (5130), and hub clamping bolt (5070 or 5075) from the bolt hole at the blade socket closest to the leading edge of the blade. Refer to Figure 10E-1.
- (3) Install the travel tube unit (5020) and bulkhead, if applicable, in accordance with Figure 10E-1.
- (4) Tighten the nut (5085) until snug, but do not torque at this time.
- (5) Move the blade to the position specified in Figure 10E-2 for the applicable de-ice kit.
- (6) Align the opening of the travel tube unit (5020) with the center of the anti-icing boot on the leading edge the blade.
  - (a) Adjust the gap between the opening of the travel tube unit (5020) and the blade in accordance with the measurement specified in Figure 10E-2 for the applicable de-ice kit.
- (7) Repeat steps (2) through (6) for all travel tube units.

CAUTION: THE TRAVEL TUBE UNIT (5020) MUST NOT CONTACT THE SPINNER DOME BLADE CUTOUT.

- (8) Put the spinner dome on the bulkhead and align the attaching holes.
  - (a) Make sure that there is clearance between the travel tube unit (5020) and the spinner dome blade cutout.
- (9) Make adjustments to the position of the travel tube unit (5020) as required.
- (10) Remove the spinner dome.

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**D-6774**

E. Installation Instruction 10E - continued

**CAUTION:** THE TRAVEL TUBE UNIT (5020) MAY ROTATE DURING THE  
TORQUE PROCESS.

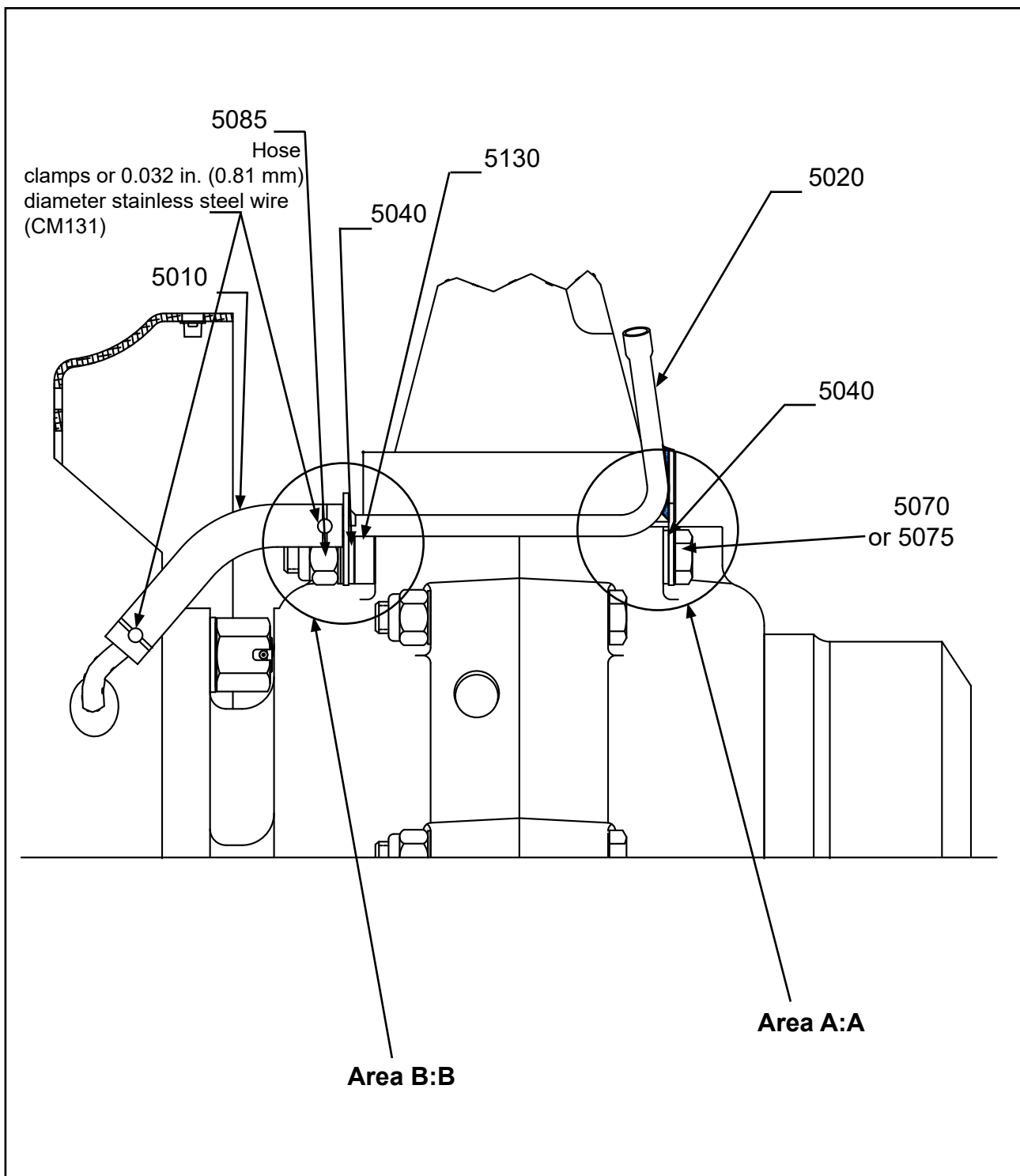
- (11) Torque the hub clamping bolt (5070 or 5075) that attaches the travel tube unit (5020) to 20-22 ft-lbs (27.1-29.8 N•m).
  - (a) Examine the alignment of the travel tube unit (5020) after torquing the hub clamping bolt (5070 or 5075).
- (12) Using hose clamps or using 0.032 in (0.81 mm) diameter stainless steel wire (A-6741-131), attach the travel tube hose (5010) to the travel tube unit (5020) as shown in Figure 10E-1.
- (13) After installation of the propeller on the aircraft and installation of the spinner dome:
  - (a) Make sure that there is clearance between the travel tube unit (5020) and the spinner dome blade cutout.
  - (b) Make sure that the travel tube unit (5020) aligns with the center of the anti-icing boot on the leading edge the blade.
  - (c) Examine the gap between the travel tube (5020) and the blade in accordance with the measurement specified in Figure 10E-2 for the applicable de-ice kit.
- (14) If the clearance between the travel tube unit (5020) and the spinner dome, the alignment of the travel tube or the gap between the travel tube and anti-icing boot do not meet the dimensions specified:
  - (a) Remove the propeller from the aircraft.
  - (b) Repeat the travel tube unit adjustment in accordance with the instructions provided in this section.



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**D-6774**

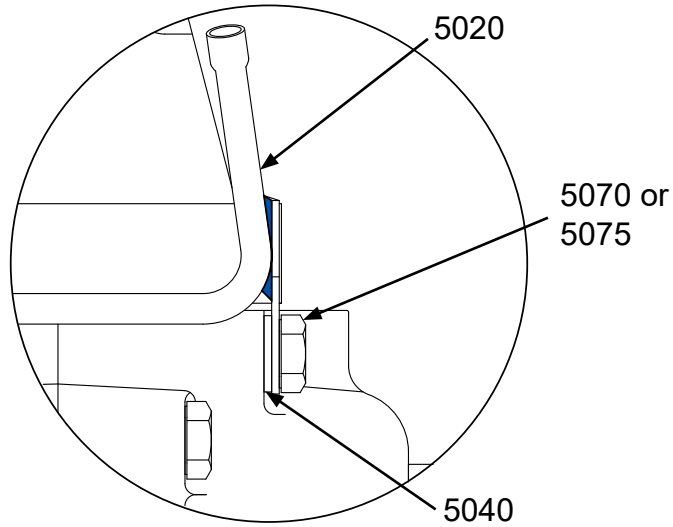


**Anti-ice Installation  
Figure 10E-1, page 1 of 2**

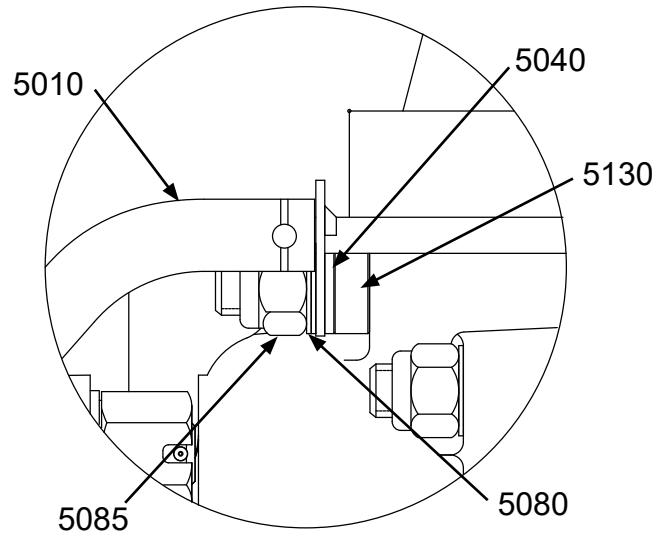
**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**D-6774**



**Area A:A**

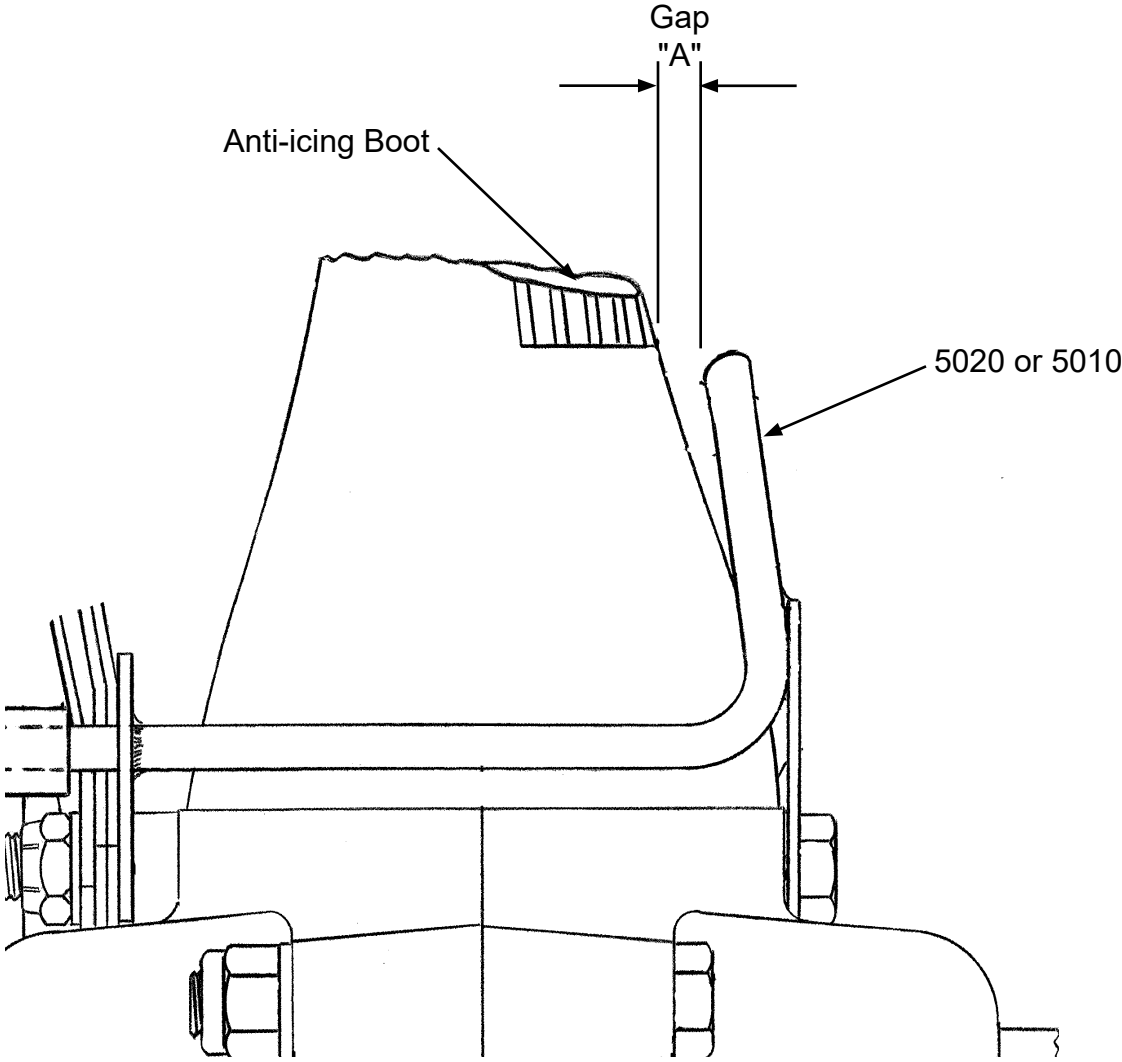


**Area B:B**

**Anti-ice Installation  
Figure 10E-1, page 2 of 2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**D-6774**



Kit Part Number	Blade Postion	Gap "A"
D-6774	Blade on Start Locks	0.06 to 0.12 inch

**Anti-ice Installation  
Figure 10E-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**D-6774**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>D-6774</b>	<b>ANTI-ICE - INSTALLATION KIT</b>		
		<b>INSTALLATION INSTRUCTIONS 10E</b>		
		<b>FIGURES: 10E-1 and 10E-2</b>		
5010	A-1866-4	• HOSE, TRAVEL TUBE MOUNTING	2	
5020	B-2361-2	• TRAVEL TUBE UNIT	2	
5040	B-3834-0663	• WASHER	4	Y
5070	A-2433	• BOLT, 3/8-24, HEX HEAD	2	
5070A	102691	• BOLT, 3/8-24, HEX HEAD ALTERNATE FOR ITEM 5070, POST HC-SL-61-347	2	
5075	A-2432	• BOLT, 3/8-24, HEX HEAD	2	Y
5080	B-3834-0632	• WASHER	2	Y
5085	A-2043-1	• NUT, HEX, SELF-LOCKING	4	Y
5130	A-2246-4	• SPACER, ALUMINUM	2	

- ITEM NOT ILLUSTRATED

**Anti-ice Kit: D-6774**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**102679-1**

**F. Installation Instruction 10F**

- (1) If applicable, remove the bulkhead from the propeller.
- (2) If required, install grommets (5275) in the holes in the bulkhead.
- (3) Remove the nut, washers, and hub clamping bolt from the bolt hole at the blade socket counterclockwise from the blade leading edge. Refer to Figure 10F-1.
- (4) Install the bulkhead to the propeller in accordance with the applicable Hartzell Owner's Manual. Do not torque the hub clamping bolt at the blade socket counterclockwise from the blade leading edge at this time.
- (5) Using the screws (5310), washers (5320), and nuts (5330) attach the slinger ring assembly (5000) to the flange on the hub. Refer to Figure 10F-1.
- (6) Install the clamp (5265) to the travel tube (5020).
- (7) Route the travel tube (5020) through the grommet (5275) in the bulkhead.
- (8) Using the previously removed hub clamping bolt, washers, spacer, and nut, install the clamp (5265) with the travel tube (5020) in accordance with Figure 10F-2.
- (9) Tighten the hub clamping nut until snug. Do not torque at this time.
- (10) With the propeller at the start lock blade angle, align the opening of the travel tube (5020) with the third rib from the center channel of the anti-icing boot on the camber side of the blade as shown in Figure 10F-2.
  - (a) Adjust the gap between the opening of the travel tube unit and the ribbed anti-ice boot surface. Refer to Figure 10F-2.
- (11) Install the travel tube hose (5010) on to the travel tube unit (5020) and the slinger ring unit (5000).
  - (a) Align as shown in Figure 10F-2.
  - (b) Do not secure with safety wire at this time.

**CAUTION: THE TRAVEL TUBE UNIT MUST NOT CONTACT THE SPINNER  
DOME BLADE CUTOUT.**

- (12) Put the spinner dome on the bulkhead aligning the attaching holes.
  - (a) Check for clearance between the travel tube (5020) and the spinner dome blade cutout.
  - (b) The travel tube must not contact the spinner dome blade cutout.

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**102679-1**

F. Installation Instruction 10F - continued

(13) Make adjustments to the position of the travel tube unit as necessary to meet the gap and clearance requirements.

(14) Remove the spinner dome.

**CAUTION:** BECAUSE THE TRAVEL TUBE UNIT MAY ROTATE DURING THE TORQUE PROCESS, CHECK THE ALIGNMENT OF THE TRAVEL TUBE UNIT AFTER TORQUING.

(15) Torque the hub clamping bolt to 20-22 ft-lbs (27-29 N•m) attaching the travel tube (5020).

(16) Using hose clamps or using 0.032 in (0.81 mm) diameter stainless steel wire (A-6741-131), attach the travel tube hose (5010) to the travel tube unit (5020) and the slinger ring assembly (5000). Refer to Figure 10F-1.

(17) After installation of the propeller on the aircraft and installation of the spinner dome:

(a) Check for clearance between the travel tube unit (5020) and the spinner dome blade cutout.

(b) Verify travel tube (5020) alignment with the anti-ice boot rib.

(c) Verify the gap between the travel tube (5020) and the anti-ice boot.

(18) If the clearance between the travel tube and the spinner dome, the alignment of the travel tube or the gap between the travel tube and anti-ice boot do not meet the dimensions specified:

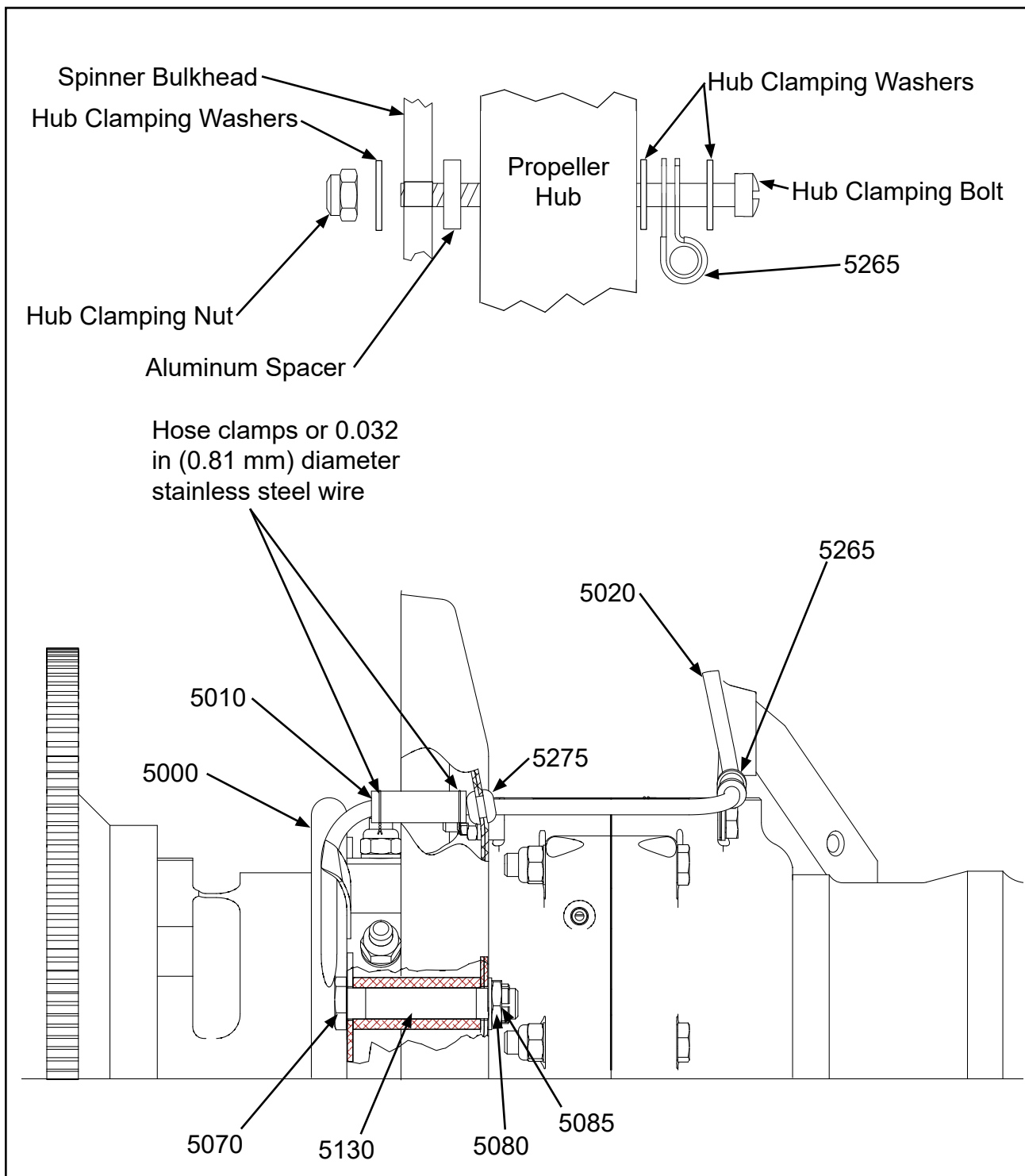
(a) Remove the propeller from the aircraft.

(b) Repeat the travel tube unit adjustment in accordance with the instructions provided in this section.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

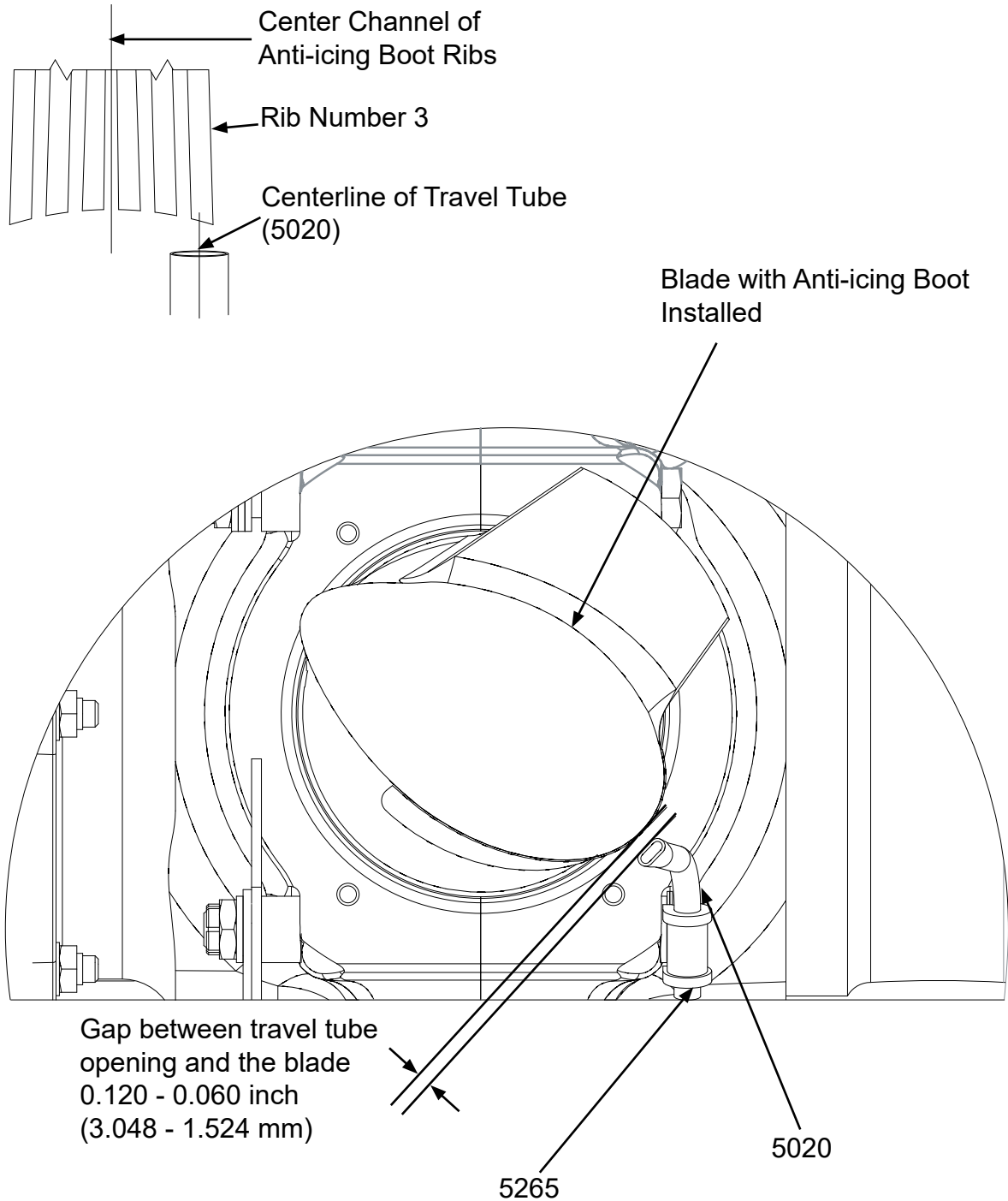
**102679-1**



**Anti-ice Installation  
Figure 10F-1, page 1 of 3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**102679-1**



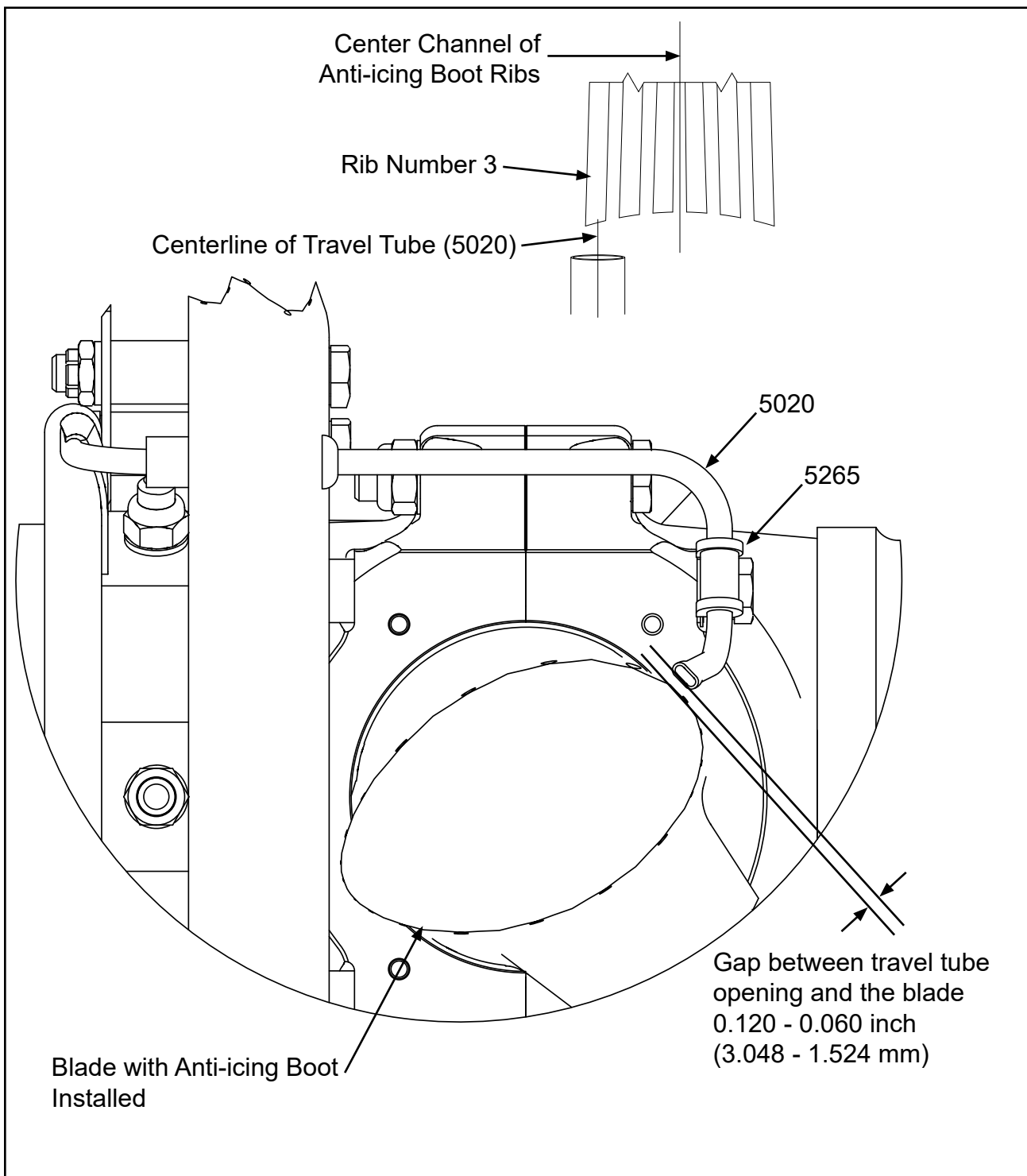
**Anti-ice Installation 102999-1 Kit  
Figure 10F-1, page 2 of 3**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**102679-1**

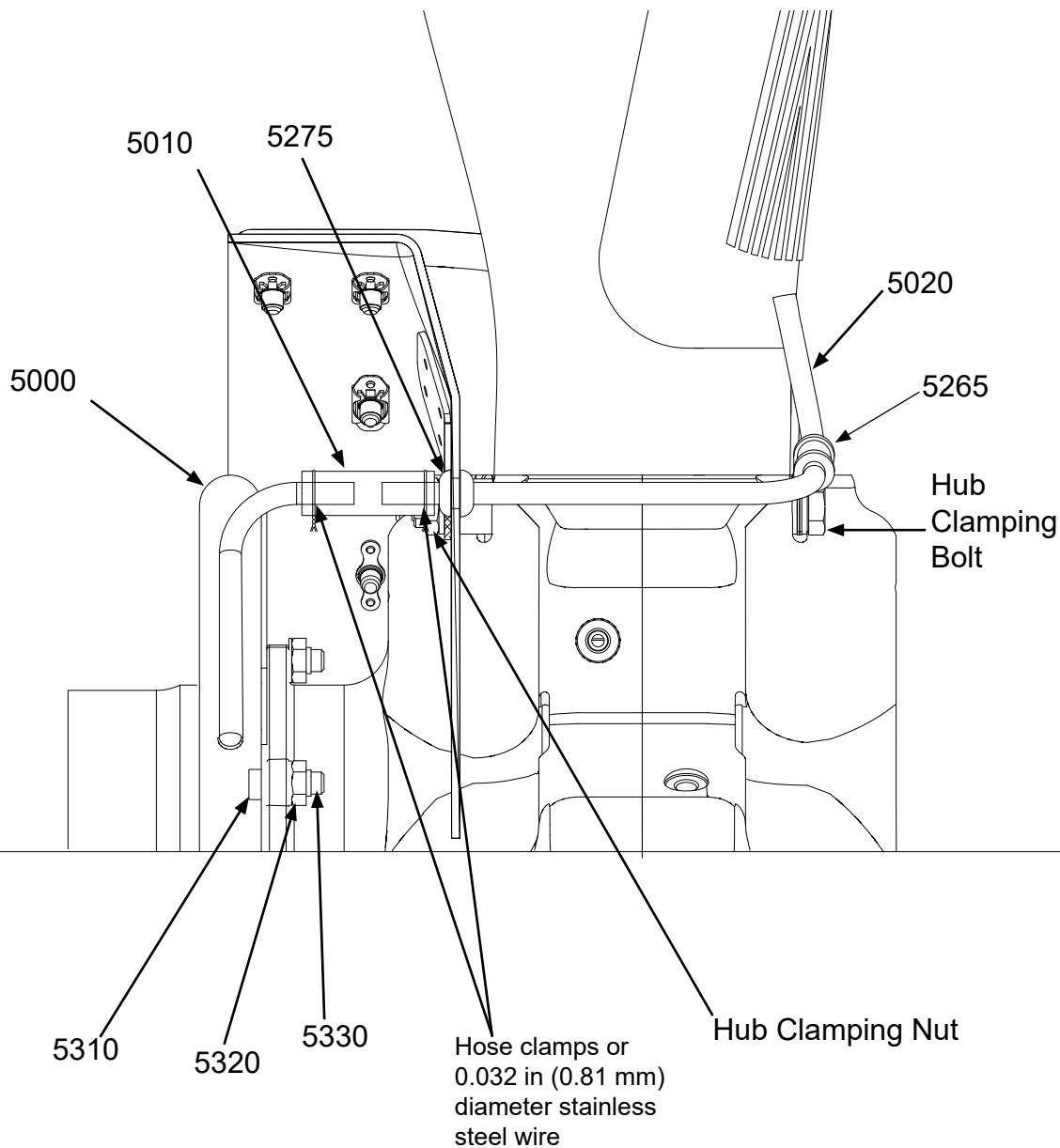


**Anti-ice Installation 102999-2 Kit  
Figure 10F-1, page 3 of 3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**102679-1**



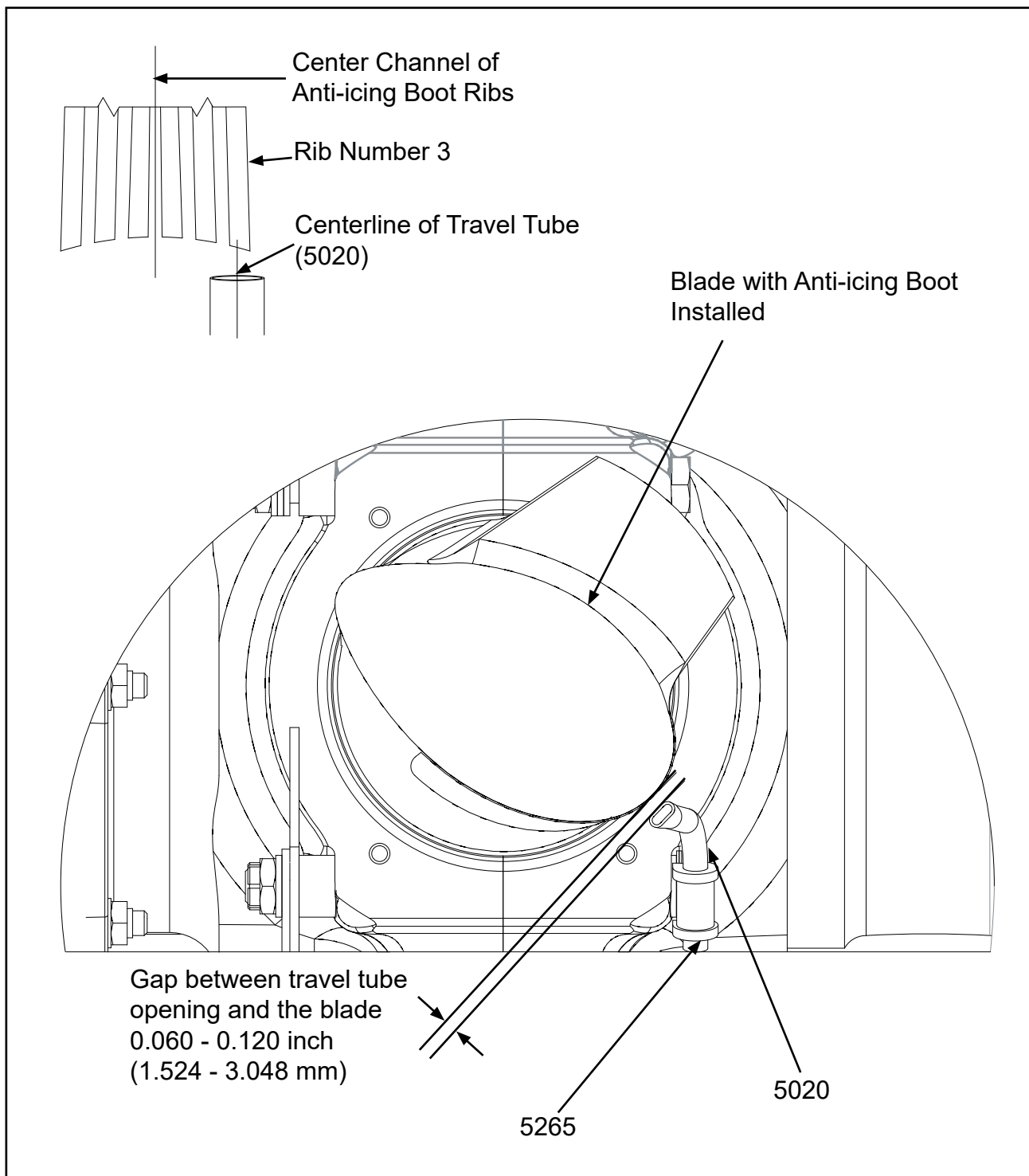
**NOTE:** When used on a Hartzell smooth forged hub, clearance for the TKS brackets may be insufficient. The hub clamping bolts which hold the TKS brackets in place, may be installed with the head of the bolt on the engine side of the hub.

**Anti-ice Installation  
Figure 10F-2, page 1 of 4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**102679-1**

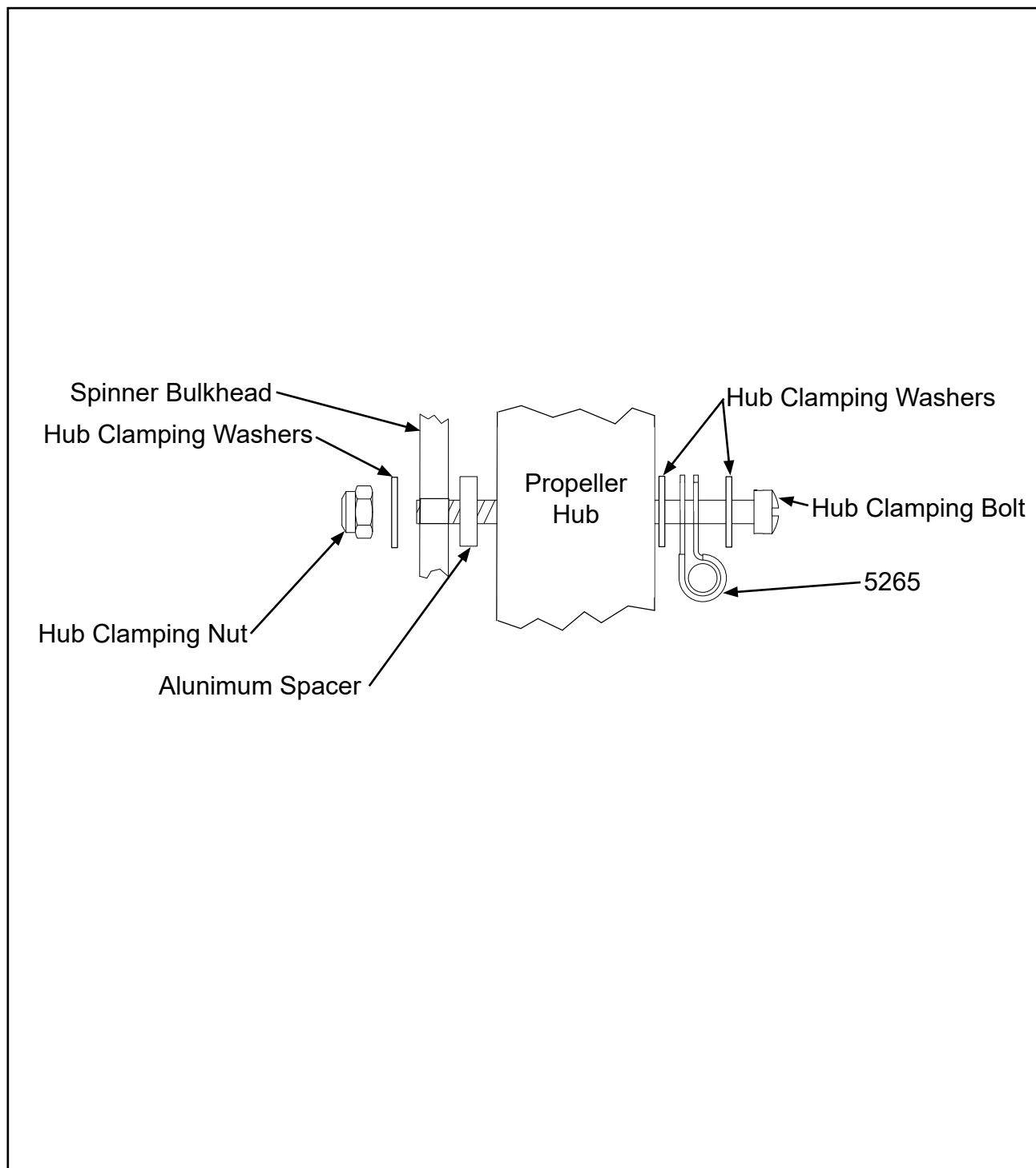


**Anti-ice Installation  
Figure 10F-2, page 2 of 4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**102679-1**



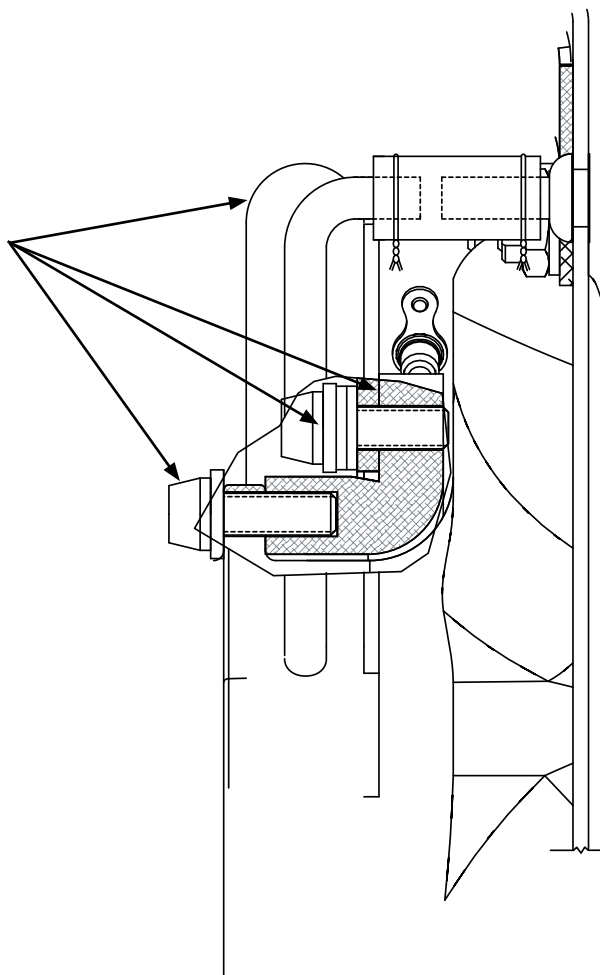
**Anti-ice Installation**  
**Figure 10F-2, page 3 of 4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**102679-1**

EXISTING AIRCRAFT  
PARTS FOR THOSE  
AIRCRAFT CURRENTLY  
EQUIPPED WITH  
HARTZELL PROPELLERS.  
FOR THOSE AIRCRAFT  
WITH McCAULEY  
PROPELLERS, PARTS  
MUST BE PURCHASED  
DIRECTLY FROM BEECH.  
REFER TO BEECH  
SERVICE DOCUMENTS  
FOR HARDWARE AND  
INSTALLATION DETAILS.



**Anti-ice Installation**  
**Figure 10F-2 , page 4 of 4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**102679-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>102679-1</b>	<b>ANTI-ICE KIT INSTALLATION INSTRUCTIONS 10F FIGURES: 10F-1 AND 10F-2</b>		
5000	C-2371-2	• SLINGER RING ASSEMBLY	1	
5010	A-1866	• HOSE, TRAVEL TUBE MOUNTING	3	
5020	102394	• TRAVEL TUBE	3	
5265	107011-55	• CLAMP, SINGLE LOOP	3	
5265A	102638	• CLAMP, SINGLE LOOP, CUSHIONED ALTERNATE FOR ITEM 5265	3	
5275	102637	• GROMMET, RUBBER	3	
5310	B-6653-43	• SCREW, 1/4-28 CAP	6	Y
5320	B-3851-0432	• WASHER	6	Y
5330	B-3808-4	• NUT, HEX, SELF-LOCKING	6	

- ITEM NOT ILLUSTRATED

**Anti-ice Kit: 102679-1**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**102679-2**

**G. Installation Instruction 10G**

- (1) If applicable, remove the bulkhead from the propeller.
- (2) If required, install grommets (5275) in the holes in the bulkhead.
- (3) Remove the nut, washers, spacer, and hub clamping bolt from the bolt hole at the blade socket counterclockwise from the blade leading edge. Refer to Figure 10G-1.
- (4) Install the bulkhead to the propeller in accordance with the applicable Hartzell Owner's Manual. Do not torque the hub clamping bolt at the blade socket counterclockwise from the blade leading edge at this time.
- (5) Attach the slinger ring unit (5000) to the flange on the hub. Refer to Figure 10G-1.
  - (a) Using existing aircraft parts for those aircraft currently equipped with Hartzell propellers.
  - (b) For those aircraft with McCauley propellers, parts must be purchased directly from Hawker Aircraft Corporation. Refer to Hawker service documents for hardware and installation details.
- (6) Install the clamp (5265) to the travel tube (5020).
- (7) Route the travel tube (5020) through the grommet (5275) in the bulkhead.
- (8) Install the clamp (5265) with the travel tube (5020) using the previously removed hub clamping bolt, washers, and nut, in accordance with Figure 10G-1.
- (9) Tighten the hub clamping nut until snug. Do not torque at this time.
- (10) With the propeller at start lock blade angle, align the opening of the travel tube (5020) with the third rib from the center channel of the anti-icing boot on the camber-side of the blade as shown in Figure 10G-1.
  - (a) Adjust the gap between the opening of the travel tube unit and the ribbed anti-ice boot surface. Refer to Figure 10G-1.
- (11) Install the travel tube hose (5010) onto the travel tube unit (5020) and the slinger ring unit (5000). Align as shown in Figure 10G-1. Do not secure with safety wire at this time.

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**102679-2**

G. Installation Instruction 10G - continued

**CAUTION:** DO NOT PERMIT THE TRAVEL TUBE UNIT TO CONTACT THE  
SPINNER DOME BLADE CUTOUT.

- (12) Put the spinner dome on the bulkhead aligning the attaching holes.
  - (a) Check for clearance between the travel tube (5020) and the spinner dome blade cutout.
  - (b) The travel tube must not contact the spinner dome blade cutout.
- (13) Make adjustments to the position of the travel tube unit as necessary to meet the gap and clearance requirements.
- (14) Remove the spinner dome.

**CAUTION:** BECAUSE THE TRAVEL TUBE UNIT MAY ROTATE DURING THE  
TORQUE PROCESS, CHECK THE ALIGNMENT OF THE TRAVEL  
TUBE UNIT AFTER TORQUING.

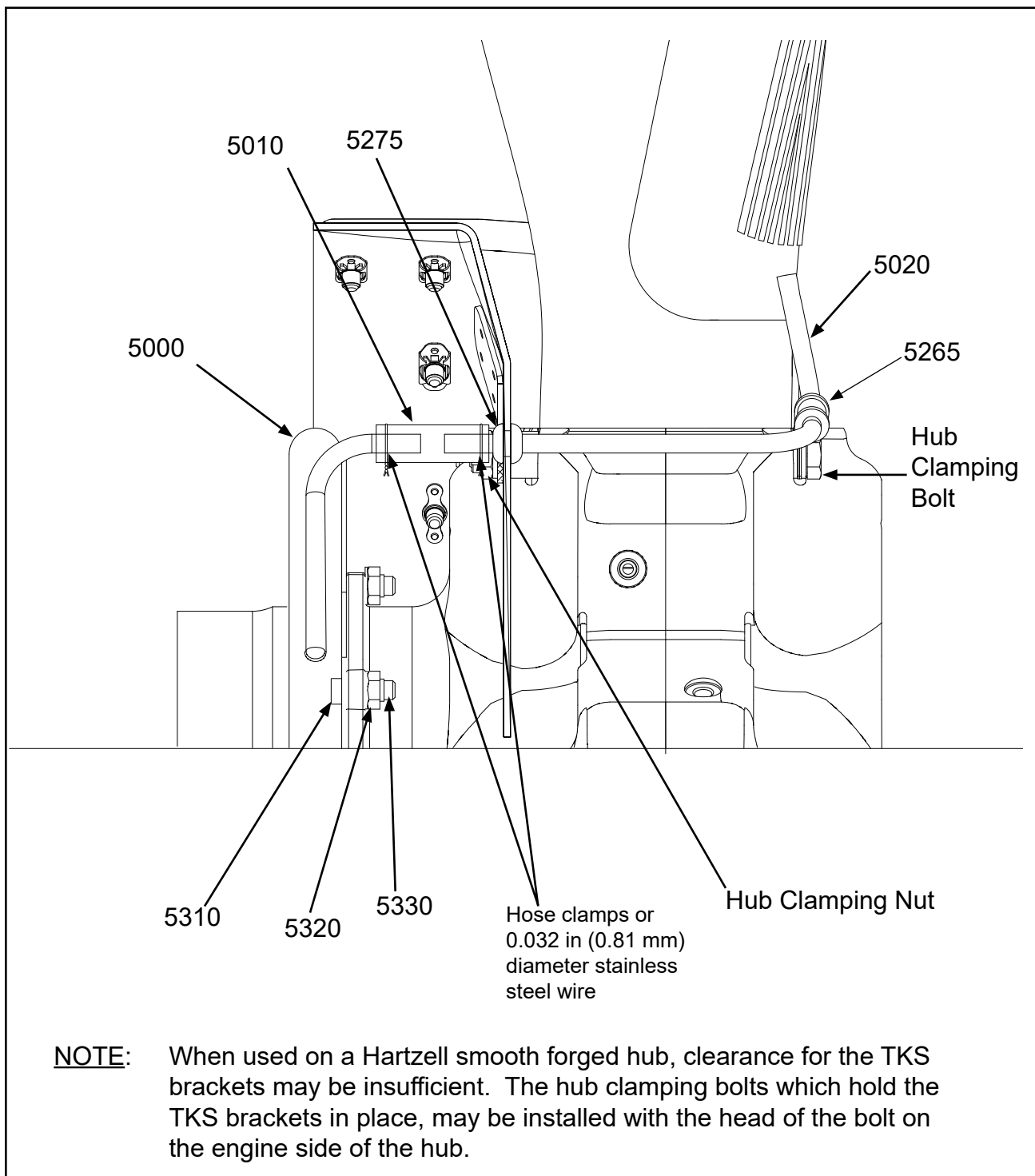
- (15) Torque the bolt (5070) 20-22 ft-lbs (27-29 N•m) to secure the slinger ring assembly (5000) to the hub.
- (16) Using hose clamps or using 0.032 in (0.81 mm) diameter stainless steel wire (A-6741-131), attach the travel tube hose (5010) to the travel tube unit (5020) and the slinger ring assembly (5000). Refer to Figure 10G-2.
- (17) After installation of the propeller on the aircraft and installation of the spinner dome:
  - (a) Check for clearance between the travel tube unit (5020) and the spinner dome blade cutout.
  - (b) Verify travel tube (5020) alignment with the anti-ice boot rib.
  - (c) Verify the gap between the travel tube (5020) and the anti-ice boot.
- (18) If the clearance between the travel tube and the spinner dome, the alignment of the travel tube or the gap between the travel tube and anti-ice boot do not meet the dimensions specified:
  - (a) Remove the propeller from the aircraft.
  - (b) Repeat the travel tube unit adjustment in accordance with the instructions provided in this section.



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

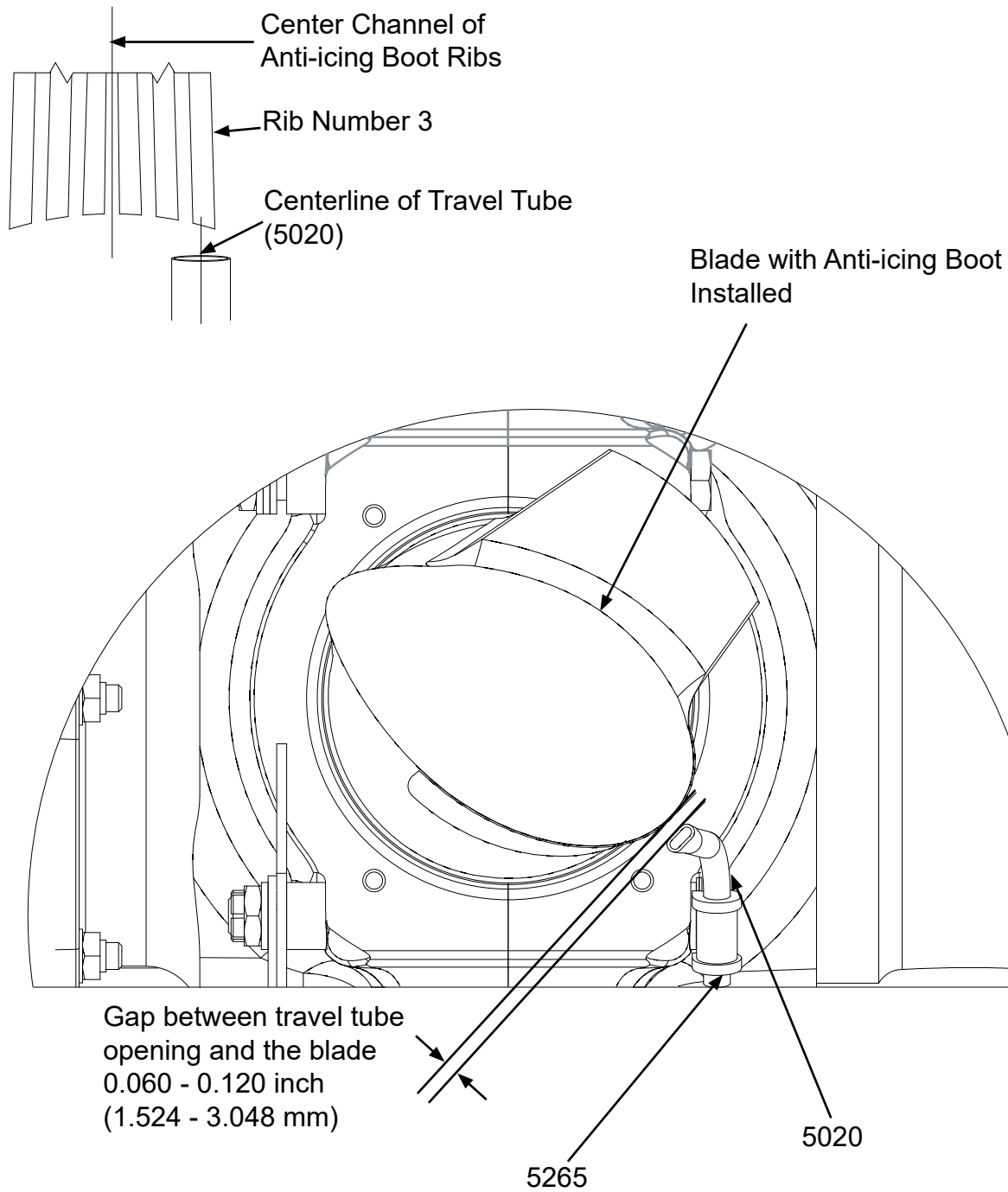
**102679-2**



**Anti-ice Installation  
Figure 10G-1, page 1 of 4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**102679-2**

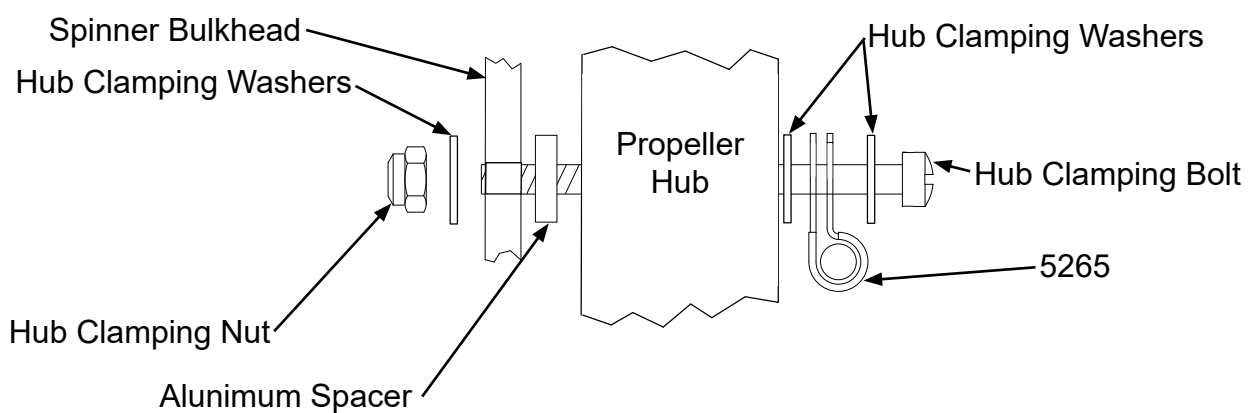


**Anti-ice Installation**  
**Figure 10G-1, page 2 of 4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**102679-2**



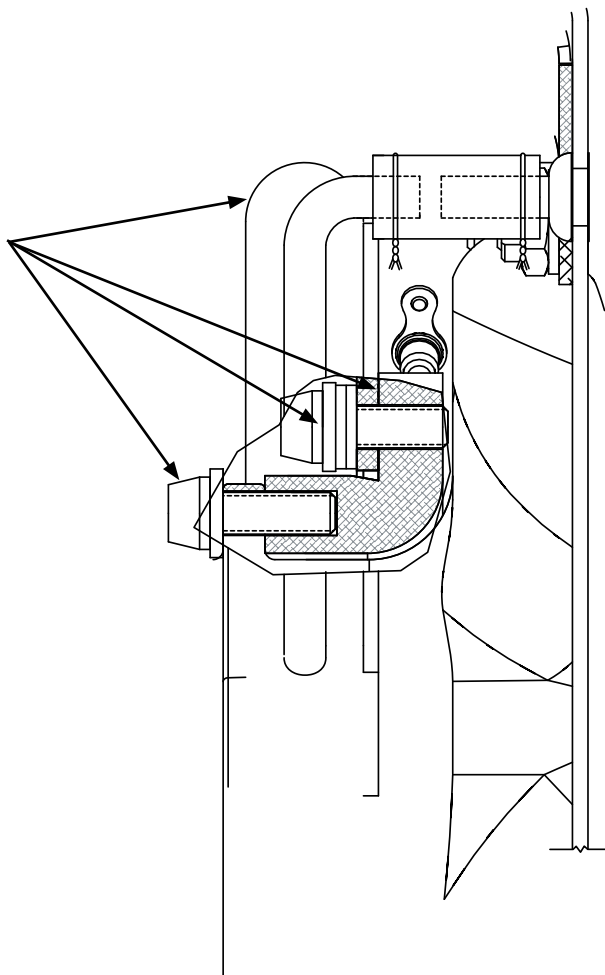
**Anti-ice Installation  
Figure 10G-1, page 3 of 4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**102679-2**

EXISTING AIRCRAFT  
PARTS FOR THOSE  
AIRCRAFT CURRENTLY  
EQUIPPED WITH  
HARTZELL PROPELLERS.  
FOR THOSE AIRCRAFT  
WITH McCAULEY  
PROPELLERS, PARTS  
MUST BE PURCHASED  
DIRECTLY FROM BEECH.  
REFER TO BEECH  
SERVICE DOCUMENTS  
FOR HARDWARE AND  
INSTALLATION DETAILS.

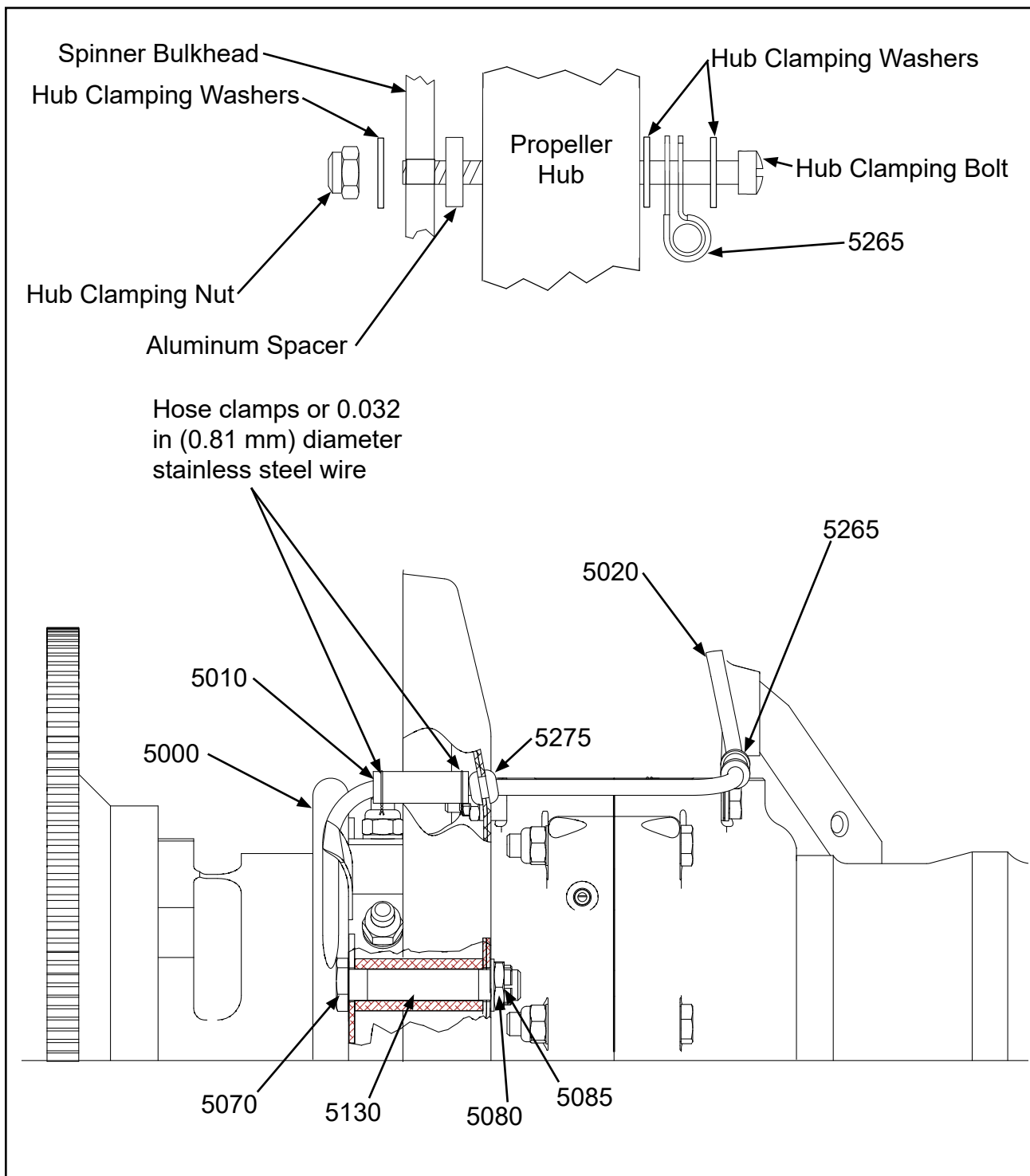


**Anti-ice Installation  
Figure 10G-1, page 4 of 4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

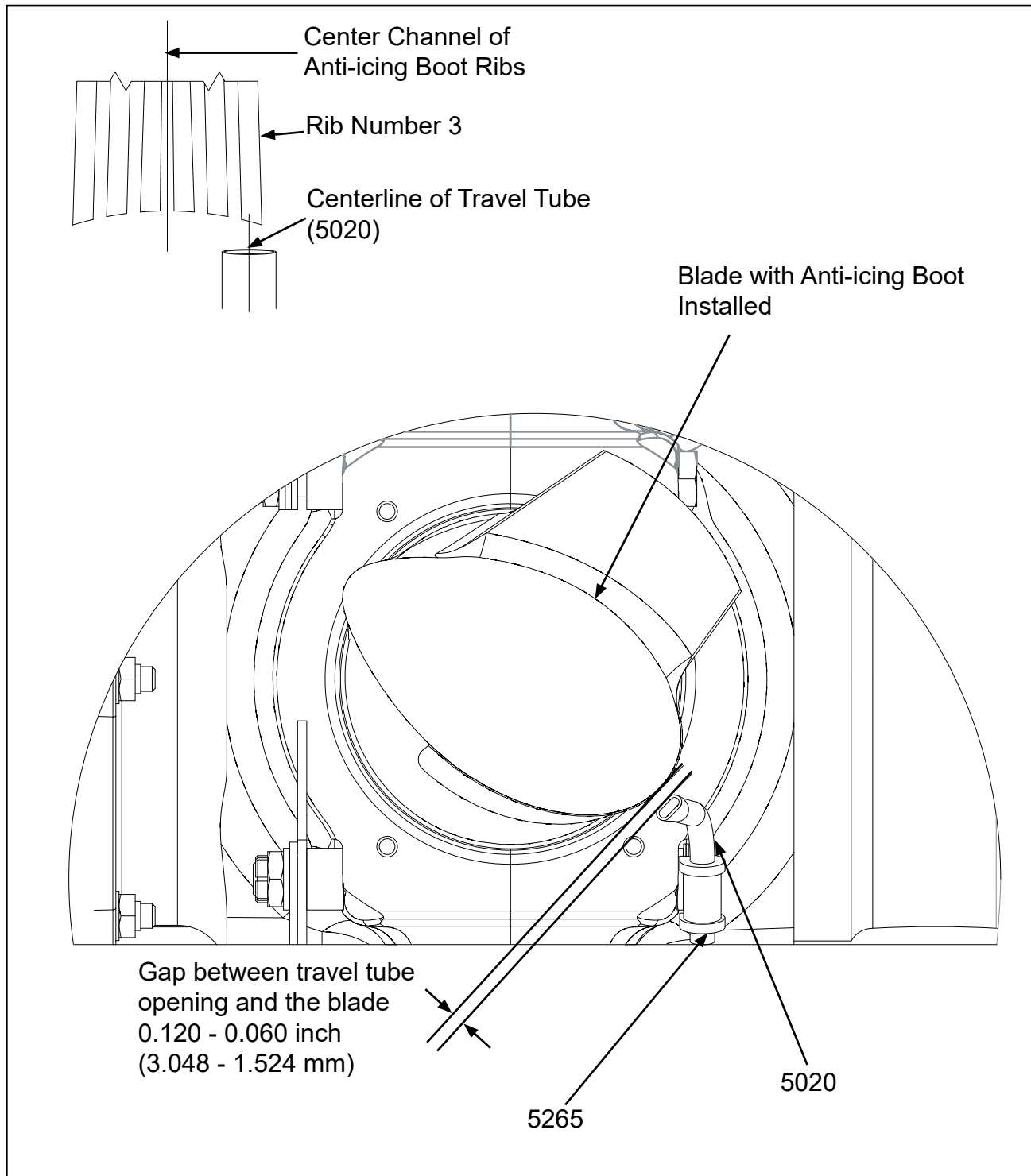
**102679-2**



**Anti-ice Installation**  
**Figure 10G-2, page 1 of 3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**102679-2**

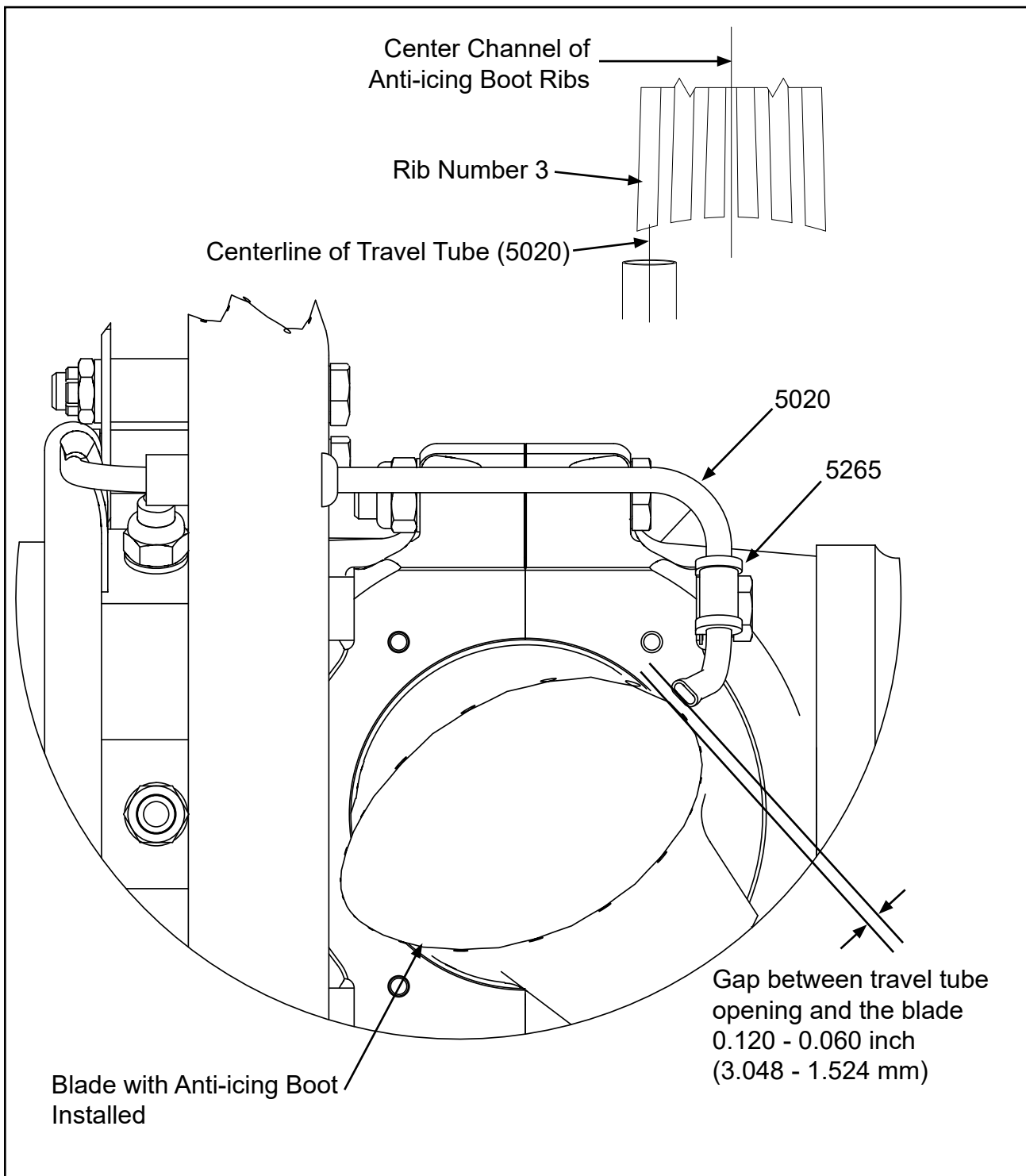


**Anti-ice Installation 102999-1 Kit  
Figure 10G-2, page 2 of 3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**102679-2**



**Anti-ice Installation 102999-2 Kit  
Figure 10G-2, page 3 of 3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**102679-2**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>102679-2</b>	<b>ANTI-ICE KIT INSTALLATION INSTRUCTIONS 10G FIGURES: 10G-1 AND 10G-2</b>		
5000	C-2385-1	• SLINGER RING ASSEMBLY	1	
5010	A-1866-1	• HOSE, TRAVEL TUBE MOUNTING	3	
5020	102394-1	• TRAVEL TUBE	3	
5265	107011-55	• CLAMP, SINGLE LOOP	3	
5265A	102638	• CLAMP, SINGLE LOOP, CUSHIONED ALTERNATE FOR ITEM 5265	3	
5275	102637	• GROMMET, RUBBER	3	Y

- ITEM NOT ILLUSTRATED

**Anti-ice Kit: 102679-2**



This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**102999-1 and 102999-2**

**H. Installation Instruction 10H**

- (1) If applicable, remove the existing nut, washers, spacer, hub clamping bolt and the spinner bulkhead from the propeller hub. The spinner bulkhead is mounted to the hub through the hub clamping bolt. Refer to Figure 10H-1.
- (2) If required, install grommets (5275) in the holes in the bulkhead.
- (3) Install the clamp (5265) to the travel tube (5020).
- (4) Route the travel tube (5020) through the grommet (5275) in the bulkhead.
- (5) Using the previously removed hub clamping bolt, washers, nut, and clamp (5265), install the travel tube unit (5020) and bulkhead in accordance with Figure 10H-1.
- (6) Tighten the clamping bolt nut until snug. Do not torque at this time.
- (7) With the propeller on the start locks, align the opening of the travel tube unit (5020) with the third rib from the center channel of the anti-icing boot on the camber-side of the blade as shown in Figure 10H-1.
  - (a) Adjust the gap between the opening of the travel tube unit and the ribbed anti-ice boot surface. Refer to Figure 10H-1.
  - (b) Refer to Figure 10H-1 for the alignment of the travel tube unit to the anti-icing boot and the gap between the opening of the travel tube unit.
- (8) Repeat for all travel tube units.

**CAUTION: DO NOT PERMIT THE TRAVEL TUBE UNIT TO CONTACT THE SPINNER DOME BLADE CUTOUT.**

- (9) Put the spinner dome on the bulkhead, aligning the attaching holes.
  - (a) Check for clearance between the travel tube unit (5020) and the spinner dome blade cutout.
  - (b) The travel tube unit must not contact the spinner dome blade cutout.
- (10) Make adjustments to the position of the travel tube unit, as necessary.
- (11) Remove the spinner dome.

**CAUTION: BECAUSE THE TRAVEL TUBE UNIT MAY ROTATE DURING THE TORQUE PROCESS, CHECK THE ALIGNMENT OF THE TRAVEL TUBE UNIT AFTER TORQUING.**

- (12) Torque the hub clamping bolt 20-22 ft-lbs (27-29 N•m) to secure the travel tube unit (5020) and spinner bulkhead to the hub.

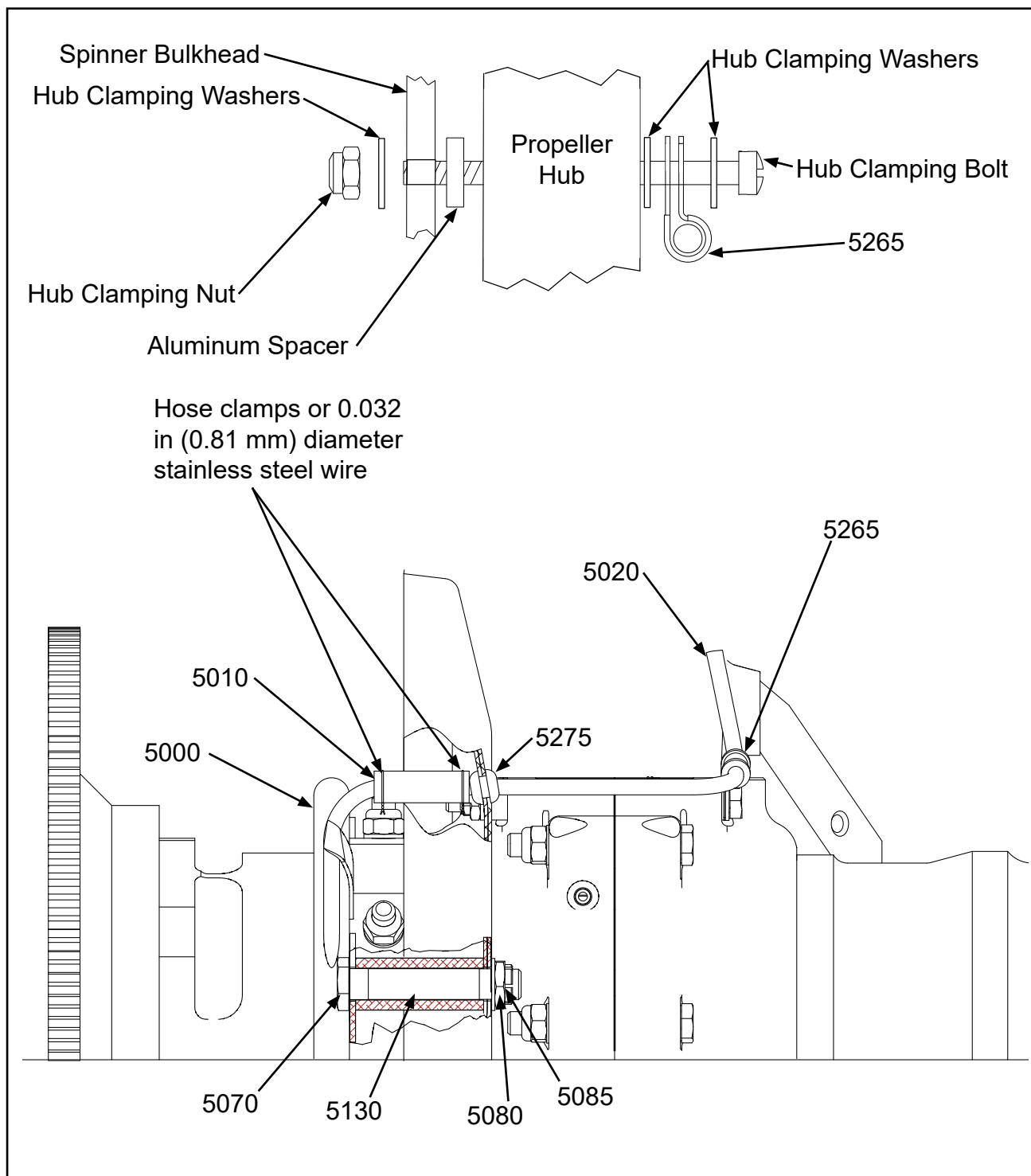
This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**102999-1 and 102999-2**

H. Installation Instruction 10H - continued

- (13) Using the bolt (5070), washer (5080), spacer (5130), and nut (5085) attach the slinger ring assembly (5000) to the hub in accordance with Figure 10H-1.
- (14) Torque the bolt (5070) 20-22 ft-lbs (27-29 N•m) to secure the slinger ring assembly (5000) to the hub.
- (15) Using hose clamps or using 0.032 in (0.81 mm) diameter stainless steel wire (A-6741-131), attach the travel tube hose (5010) to the travel tube unit (5020) and the slinger ring assembly (5000). Refer to Figure 10H-1.
- (16) After installation of the propeller on the aircraft and installation of the spinner dome:
  - (a) Check for clearance between the travel tube unit (5020) and the spinner dome blade cutout.
  - (b) Verify travel tube (5020) alignment with the anti-ice boot rib.
  - (c) Verify the gap between the travel tube (5020) and the anti-ice boot.
- (17) If the clearance between the travel tube and the spinner dome, the alignment of the travel tube or the gap between the travel tube and anti-ice boot do not meet the dimensions specified:
  - (a) Remove the propeller from the aircraft.
  - (b) Repeat the travel tube unit adjustment in accordance with the instructions provided in this section.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

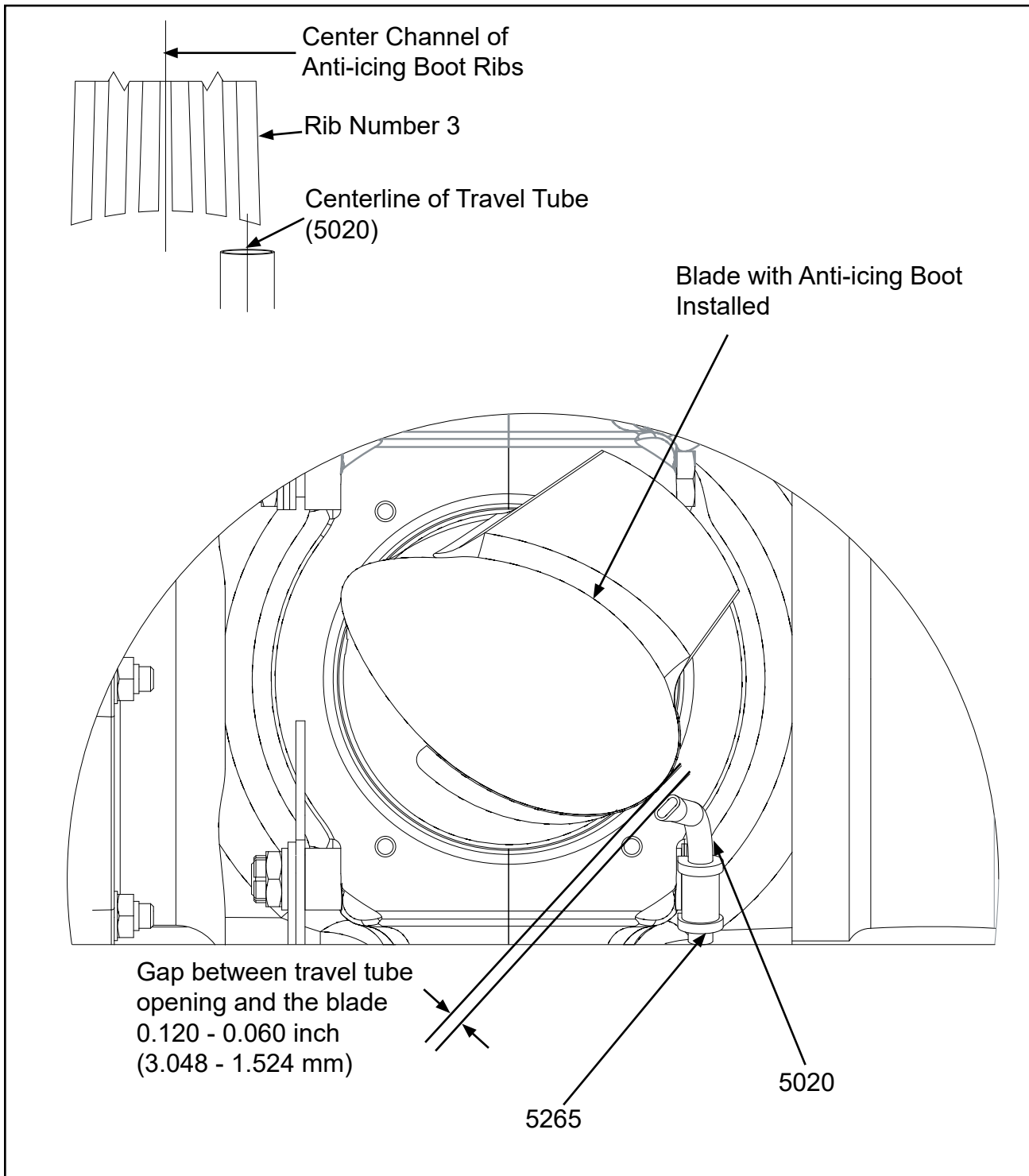
This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**102999-1 and 102999-2**



**Anti-ice Installation  
Figure 10H-1, page 1 of 3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

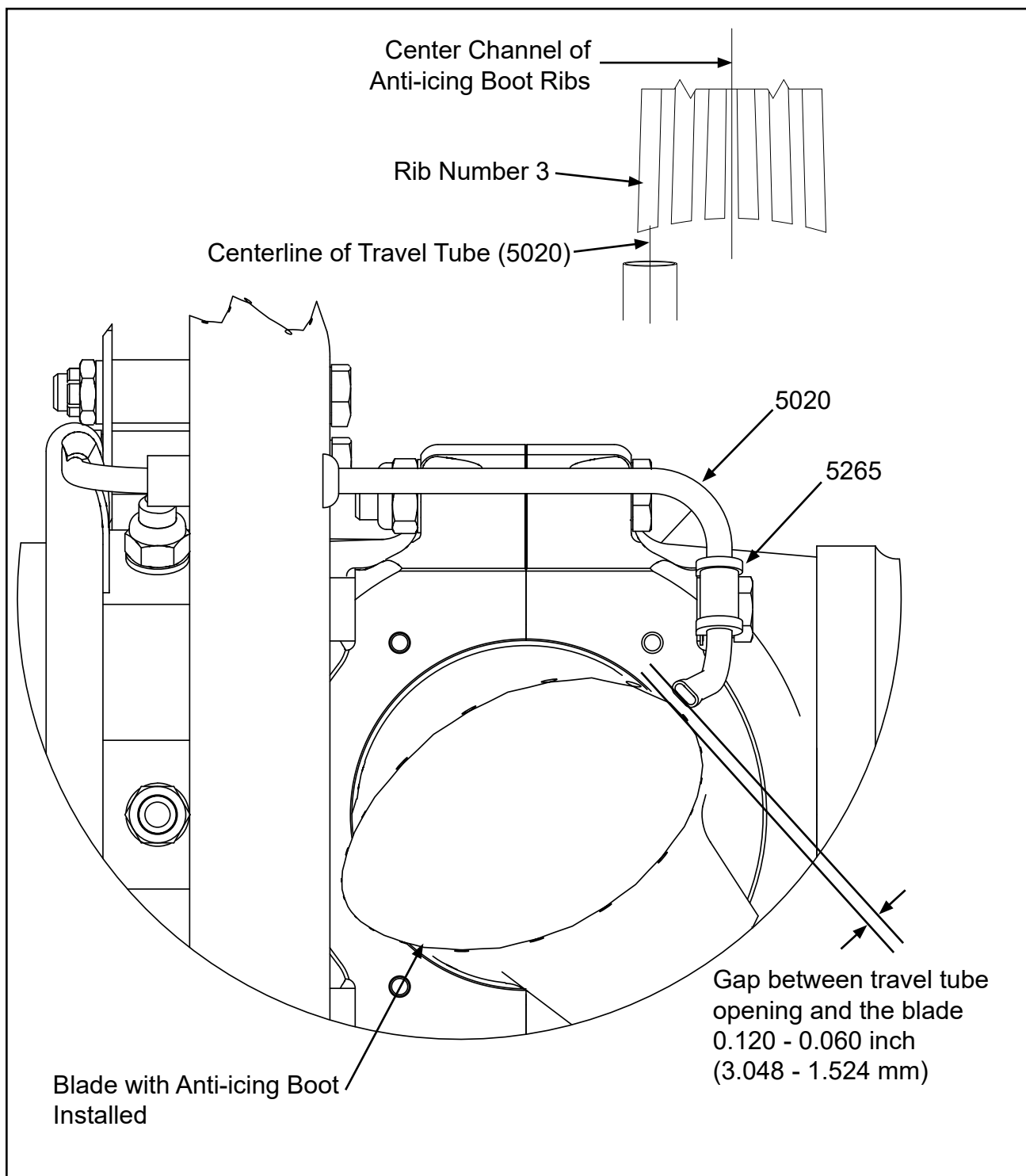
This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**102999-1 and 102999-2**



**Anti-ice Installation 102999-1 Kit  
Figure 10H-1, page 2 of 3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**102999-1 and 102999-2**



**Anti-ice Installation 102999-2 Kit**  
**Figure 10H-1, page 3 of 3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**102999-1 and 102999-2**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>102999-1</b>	<b>ANTI-ICE KIT INSTALLATION INSTRUCTIONS 10H FIGURE: 10H-1</b>		
5000	102964	• SLINGER RING ASSEMBLY	1	
5010	A-1866	• HOSE, TRAVEL TUBE MOUNTING	2	
5020	103130	• TRAVEL TUBE	2	
5070	A-2431	• BOLT, 3/8-24, HEX-HEAD	4	
5080	B-3834-0663	• WASHER	4	
5085	B-3599	• NUT, 3/8-24, HEX, SELF-LOCKING	4	
5265	107011-55	• CLAMP, SINGLE LOOP	2	
5265A	102638	• CLAMP, SINGLE LOOP, CUSHIONED ALTERNATE FOR ITEM 5265	2	
5275	102637	• GROMMET, RUBBER	2	Y
5130	A-2246-2	• SPACER, ALUMINUM	4	
	<b>102999-2</b>	<b>ANTI-ICE KIT INSTALLATION INSTRUCTIONS 10H FIGURE: 10H-1</b>		
5000	102964L	• SLINGER RING ASSEMBLY	1	
5010	A-1866	• HOSE, TRAVEL TUBE MOUNTING	2	
5020	103130L	• TRAVEL TUBE	2	
5070	A-2431	• BOLT, 3/8-24, HEX-HEAD	4	
5080	B-3834-0663	• WASHER	4	
5085	B-3599	• NUT, 3/8-24, HEX, SELF-LOCKING	4	
5130	A-2246-2	• SPACER, ALUMINUM	4	
5265	107011-55	• CLAMP, SINGLE LOOP	2	
5265A	102638	• CLAMP, SINGLE LOOP, CUSHIONED ALTERNATE FOR ITEM 5265	2	
5275	102637	• GROMMET, RUBBER	2	Y

- ITEM NOT ILLUSTRATED

**Anti-ice Kits: 102999-1 and 102999-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**103313**

I. Installation Instruction 10I

- (1) If applicable, remove the existing nut, washers, spacer, hub clamping bolt and the spinner bulkhead from the propeller hub. The spinner bulkhead is mounted to the hub through the hub clamping bolt. Refer to Figure 10I-1.
- (2) If required, install grommets (5275) in the holes in the bulkhead.
- (3) Install the clamp (5265) to the travel tube (5020).
- (4) Route the travel tube (5020) through the grommet (5275) in the bulkhead.
- (5) Using the previously removed hub clamping bolt, washers, nut, and clamp (5265), install the travel tube unit (5020) and bulkhead in accordance with Figure 10I-1.
- (6) Tighten the clamping bolt nut until snug. Do not torque at this time.
- (7) With the propeller on the start locks, align the opening of the travel tube unit (5020) with the third rib from the center channel of the anti-icing boot on the camber-side of the blade as shown in Figure 10I-1.
  - (a) Adjust the gap between the opening of the travel tube unit and the ribbed anti-ice boot surface. Refer to Figure 10I-1.
- (8) Repeat for all travel tube units.

**CAUTION:** DO NOT PERMIT THE TRAVEL TUBE UNIT TO CONTACT THE SPINNER DOME BLADE CUTOUT.

- (9) Put the spinner dome on the bulkhead, aligning the attaching holes.
  - (a) Check for clearance between the travel tube unit (5020) and the spinner dome blade cutout.
  - (b) The travel tube unit must not contact the spinner dome blade cutout.
- (10) Make adjustments to the position of the travel tube unit, as necessary.
- (11) Using care, remove the spinner dome.

**CAUTION:** BECAUSE THE TRAVEL TUBE UNIT MAY ROTATE DURING THE TORQUE PROCESS, CHECK THE ALIGNMENT OF THE TRAVEL TUBE UNIT AFTER TORQUING.

- (12) Torque the hub clamping bolt 20-22 ft-lbs (27-29 N•m) to secure the travel tube unit (5020) and spinner bulkhead to the hub.
- (13) Install the travel tube hose (5010) loosely on the slinger ring assembly (5000).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**103313**

I. Installation Instruction 10I - continued

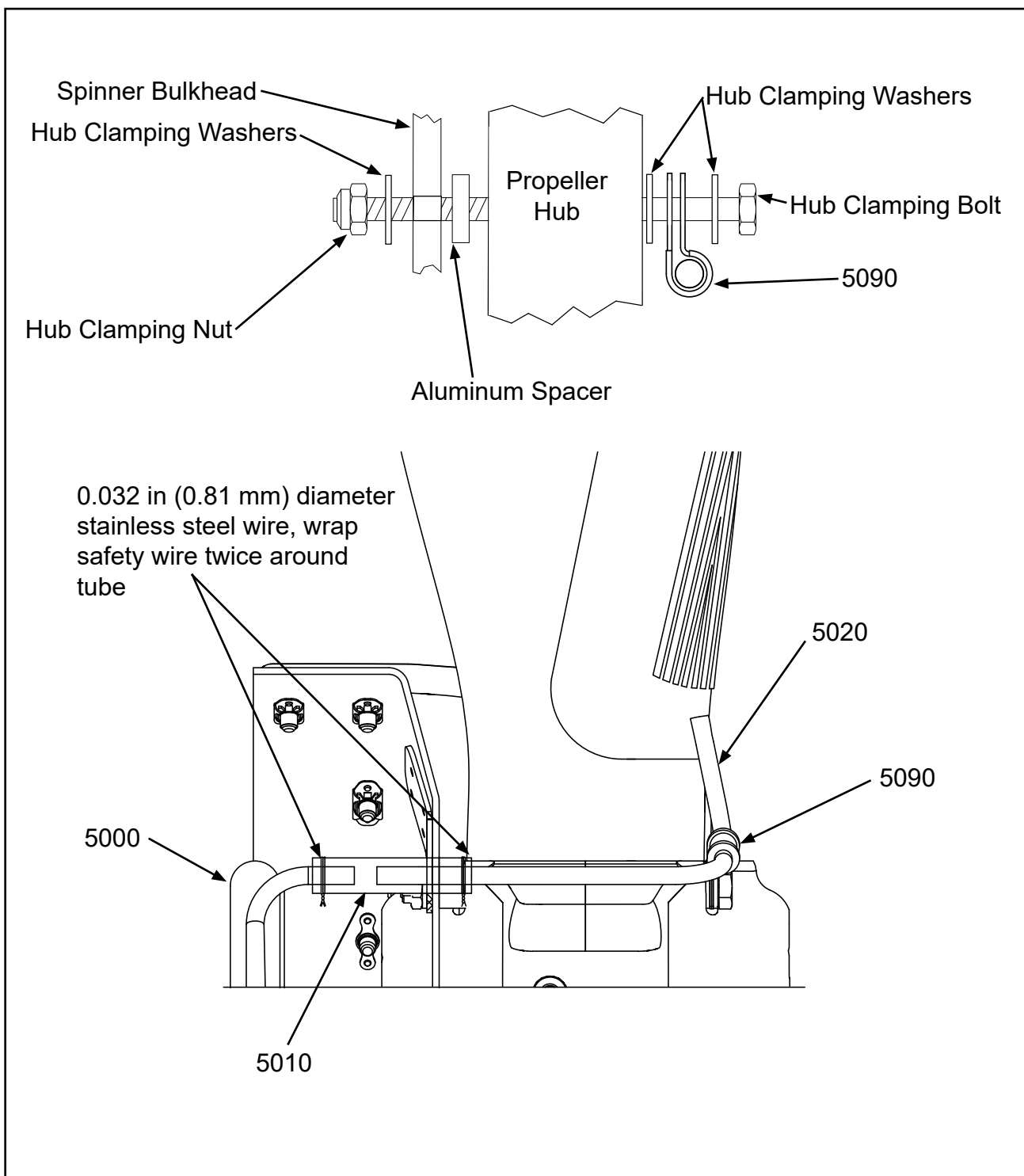
- (14) Align the travel tube hose with the travel tube (unit).
- (15) Using the bolt (5210) attach the slinger ring assembly (5000) to the hub in accordance with Figure 10I-1.
- (16) Using hose clamps or using 0.032 in (0.81 mm) diameter stainless steel wire (A-6741-131), align and secure the travel tube hose (5010) to the travel tube unit (5020) and the slinger ring assembly (5000). Refer to Figure 10I-1.
- (17) After installation of the propeller on the aircraft and installation of the spinner dome:
  - (a) Check for clearance between the travel tube unit (5020) and the spinner dome blade cutout.
  - (b) Verify travel tube (5020) alignment with the anti-ice boot rib.
  - (c) Verify the gap between the travel tube (5020) and the anti-ice boot.
- (18) If the clearance between the travel tube and the spinner dome, the alignment of the travel tube or the gap between the travel tube and anti-ice boot do not meet the dimensions specified:
  - (a) Remove the propeller from the aircraft.
  - (b) Repeat the travel tube unit adjustment in accordance with the instructions provided in this section.



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

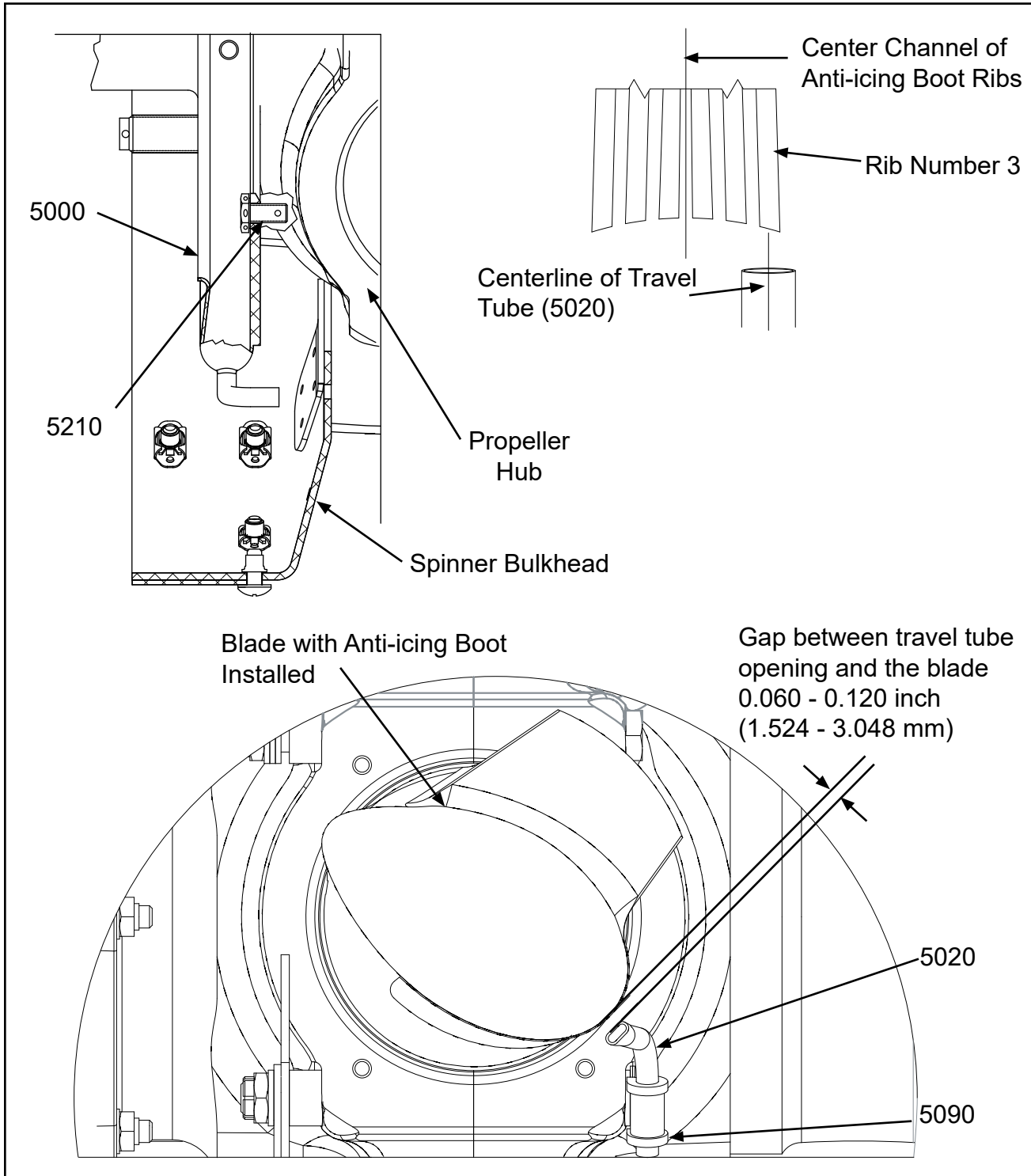
**103313**



**Anti-ice Installation  
Figure 10I-1, page 1 of 2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**103313**



**Anti-ice Installation**  
**Figure 10I-1, page 2 of 2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**103313**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>103313</b>	<b>ANTI-ICE KIT INSTALLATION INSTRUCTIONS 10I FIGURE: 10I-1</b>		
5000	C-2371-3	• SLINGER RING ASSEMBLY	1	
5010	A-1866-3	• HOSE, TRAVEL TUBE MOUNTING	3	
5020	102394-2	• TRAVEL TUBE	3	
5090	107011-55	• CLAMP, SINGLE LOOP	3	Y
5090A	102638	• CLAMP, SINGLE LOOP, CUSHIONED ALTERNATE FOR ITEM 5090	3	Y
5210	B-3384-1H	• BOLT, 1/4-28, HEX-HEAD	3	Y

- ITEM NOT ILLUSTRATED

**Anti-ice Kits: 103313**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**103313**

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This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**103682**

J. Installation Instruction 10J

**NOTE:** The slinger ring assembly on Lycoming installations is integrated with the starter ring gear.

- (1) If applicable, remove the spinner bulkhead from the propeller hub. The spinner bulkhead may be mounted to the mounting area of the starter ring gear with a bolt, washer, and nut or it may be mounted to the hub through the hub clamping bolt.
- (2) Remove the hub clamping nut, washers, aluminum spacer (5130), and hub clamping bolt from the bolt hole at the blade socket closest to the leading edge of the blade. Refer to Figure 10J-1.
- (3) Install the travel tube unit (5020) using the P-clip (5090) and the previously installed hub clamping bolt, washers, aluminum spacer, and nut, in accordance with Figure 10J-1.
- (4) Snug the hub clamping nut. Do not torque the hub clamping nut at this time.
- (5) With the propeller at low blade angle, align the opening of the travel tube unit (5020) with the second rib from the center channel of the anti-ice boot on the camber-side of the blade as shown in Figure 10J-1.
  - (a) Adjust the gap between the opening of the travel tube unit and the ribbed anti-ice boot surface. Refer to Figure 10J-1.
- (6) Repeat for all travel tube units.

**CAUTION:** THE TRAVEL TUBE UNIT MUST NOT CONTACT THE SPINNER DOME BLADE CUTOUT.

- (7) Put the spinner dome on the bulkhead, aligning the attaching holes. Check for clearance between the travel tube unit (5020) and the spinner dome blade cutout. The travel tube unit must not contact the spinner dome blade cutout.
- (8) Make adjustments to the position of the travel tube unit as required.
- (9) Remove the spinner dome.

**CAUTION:** THE TRAVEL TUBE UNIT MAY ROTATE DURING THE TORQUE PROCESS, CHECK ALIGNMENT OF THE TRAVEL TUBE UNIT AFTER TORQUING.

- (10) Torque the hub clamping bolt 20-22 Ft-Lbs (27.1-29.8 N•m), securing the travel tube unit (5020).

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

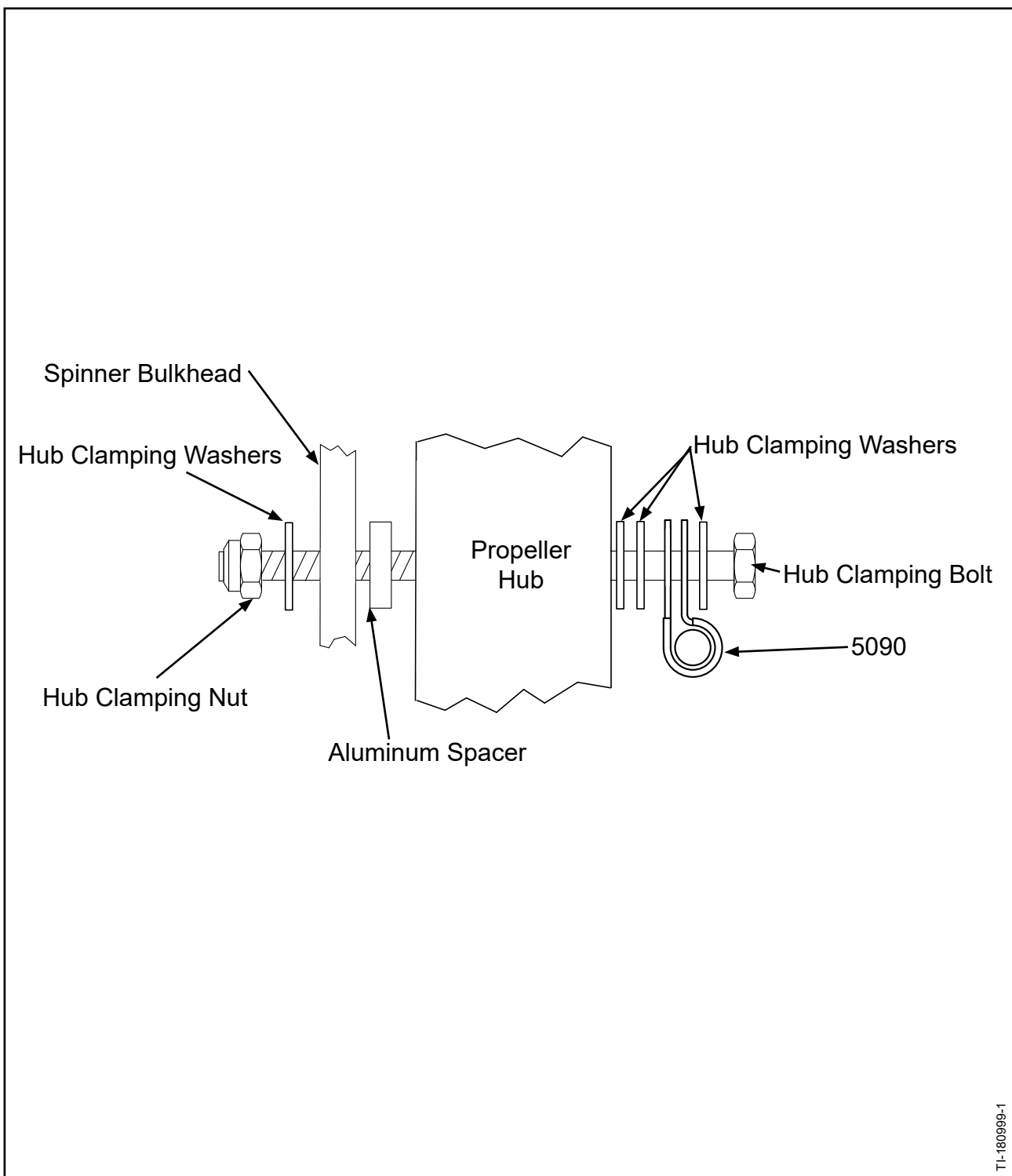
**103682**

J. Installation Instruction 10J - continued

- (11) Using the bolt (5100), washer (5220), and nut (5200) attach the slinger ring assembly (5000) to the hub in accordance with Figure 10J-1.
- (12) Using hose clamps or using 0.032 in (0.81 mm) diameter stainless steel wire (A-6741-131), attach the travel tube hose (5010) to the travel tube unit (5020) and the slinger ring assembly (5000). Refer to Figure 10J-1.
- (13) After installation of the propeller on the aircraft and installation of the spinner dome:
  - (a) Check for clearance between the travel tube unit (5020) and the spinner dome blade cutout.
  - (b) Check the travel tube (5020) alignment with the anti-ice boot rib.
  - (c) Check the gap between the travel tube (5020) and the anti-ice boot.
- (14) If the clearance between the travel tube and the spinner dome, the alignment of the travel tube, or the gap between the travel tube and anti-ice boot do not meet the dimensions specified:
  - (a) Remove the propeller from the aircraft.
  - (b) Repeat the travel tube unit adjustment in accordance with the instructions provided in this section.

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

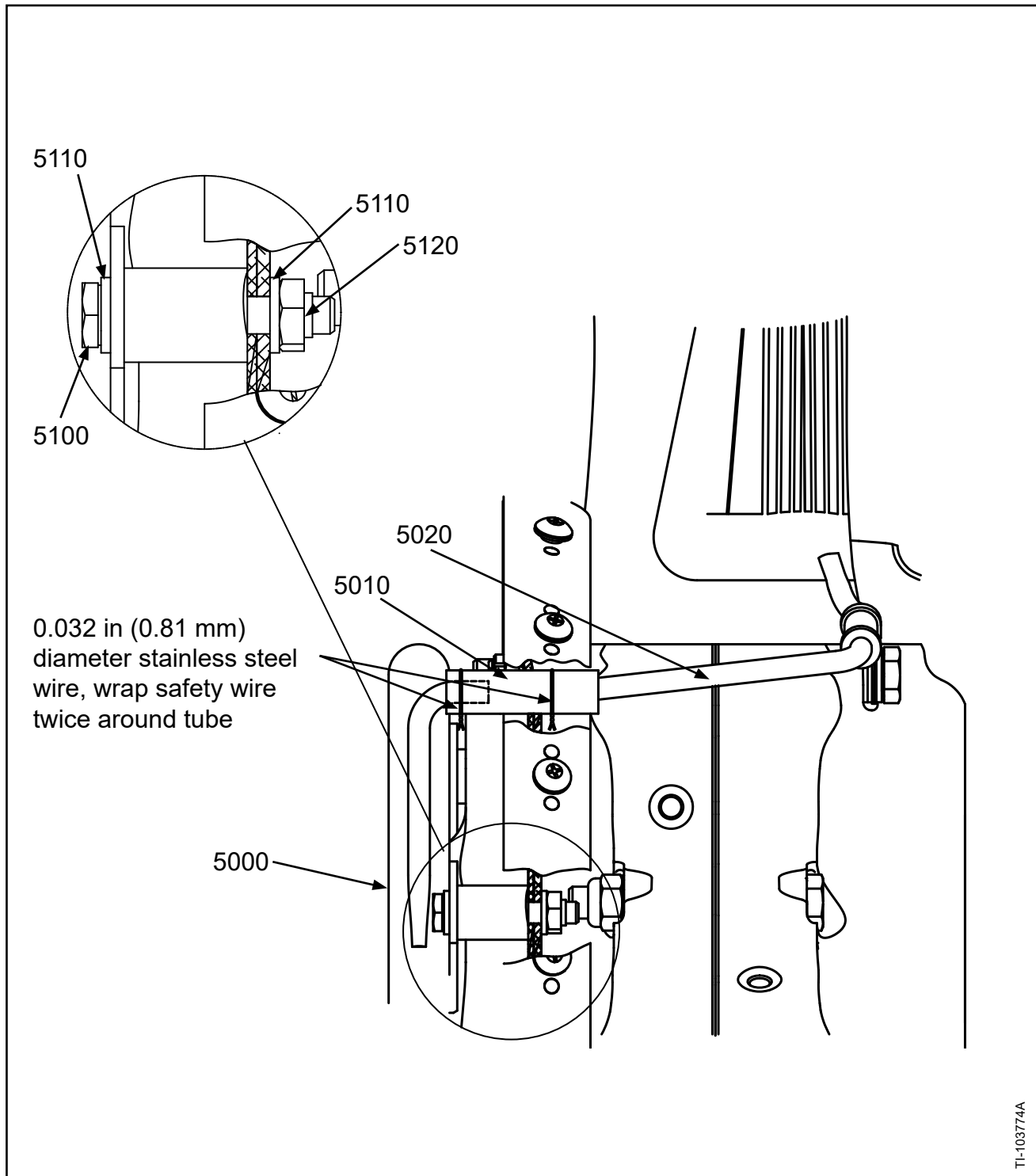
**103682**



**Anti-ice Installation**  
**Figure 10J-1 Page 1 of 3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**103682**



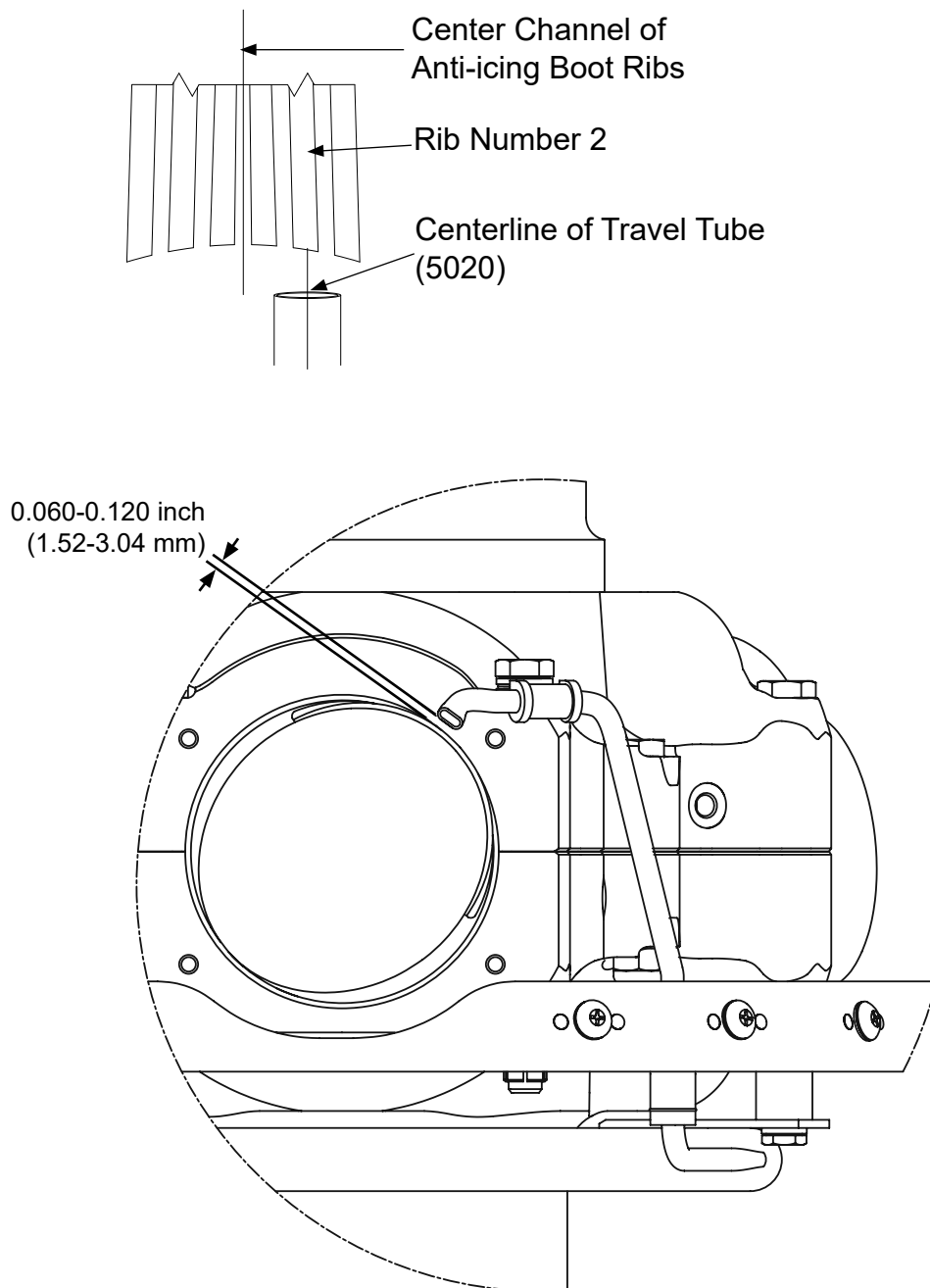
**Anti-ice Installation  
Figure 10J-1 Page 2 of 3**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**103682**



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**Anti-ice Installation  
Figure 10J-1 Page 3 of 3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**103682**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>103682</b>	<b>ANTI-ICE KIT INSTALLATION INSTRUCTIONS 10J FIGURES: 10J-1</b>		
5000	D-4688-1	• SLINGER RING UNIT	1	
5010	A-1866-3	• HOSE, TRAVEL TUBE MOUNTING	3	
5020	103696	• TRAVEL TUBE	3	
5040	B-3834-0632	• WASHER	3	Y
5090	107011-55	• CLAMP, SINGLE LOOP, CUSHIONED	3	
5090A	102638	• CLAMP, SINGLE LOOP, CUSHIONED ALTERNATE FOR ITEM 5090	3	
5130	A-4692-1	• SPACER, SLINGER RING	3	
5100	B-3384-18H	• BOLT, 1/4-28, HEX HEAD	3	Y
5110	B-3834-0463	• WASHER	6	
5120	B-3808-4	• NUT, HEX, SELF-LOCKING	3	Y

- ITEM NOT ILLUSTRATED

**Anti-ice Kits: 103682**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**103726 and 105395**

**K.     Installation Instruction 10K**

- (1) Install the slinger ring (100) onto the bulkhead in accordance with Figure 10K-1 and the following steps:

**NOTE:**     The slinger ring installation can be performed with the bulkhead installed on the propeller hub.

- (a) Using cleaning solvent and an abrasive pad CM47, clean the area of the bulkhead for installation of the slinger ring assembly (100).

1     Approved solvents: Methyl-Ethyl-Keytone CM106, Acetone CM11, Toluene CM41, or Isopropyl Alcohol CM183

- (b) Using an approved cleaning solvent clean the mounting surface of the slinger ring assembly (100).

- (c) Using masking material, mask the fluid flow holes of the special studs (200) and the fluid flow holes in the slinger ring assembly (100).

**CAUTION:**     **MAKE SURE THE SEALANT CM161 DOES NOT PLUG THE FLUID FLOW HOLES OF THE FOUR SPECIAL STUDS (200) DURING ASSEMBLY. FLUID HOLES MAY BE CLEANED WITH A SOLVENT SOAKED COTTON SWAB OR SIMILAR DEVICE AS NEEDED.**

- (d) Apply sealant CM161 to the sealant groove in the slinger ring assembly (100). Refer to Figure 10K-1.

**NOTE:**     Sealant should slightly over-fill the groove.

- (e) Apply sealant CM161 to four screws (300).
- (f) Using screws (300) and washers (400) and attach the slinger ring assembly to the bulkhead. Hand tighten but do not torque at this time.
- (g) Apply sealant, CM161, to the threads of the four special studs (200).
- (h) Install the washer (500) on each of the four special studs (200).
- (i) Install the four special studs (200) with the washer (500) through the threaded holes in the bulkhead and into the slinger ring assembly (100).
- (j) Using an alternating sequence, torque each special stud (200) to 81-99 in. lb. (9.1-11.2 N•m).
- (k) Using an alternating sequence, torque each screw (300) to 10-15 in. lbs. (1.1-1.2 N•m).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**103726 and 105395**

**K. Installation Instruction 10K - continued**

- (l) Examine the bulkhead to slinger ring assembly (100) seal line for excessive sealant squeeze-out.
- (m) Using a gloved finger or a cloth dampened with an approved solvent, clean and smooth any excess sealant that squeezed out from around the screws (300), special studs (200) or between the slinger ring assembly (100) and the bulkhead.
- (n) Using solvent, clean the fluid flow holes of the four special studs and the fluid flow holes in the slinger ring assembly.
- (o) Permit the sealant to dry for a minimum of 8 hours.

**NOTE:** Bulkhead/slinger ring assembly may be carefully handled after 2 hours.

- (2) Install the bulkhead onto the propeller in accordance with the applicable Hartzell Propeller owner's manual.

**CAUTION:** REMOVE ONLY ONE HUB CLAMPING BOLT AT A TIME. THE SEAL BETWEEN THE HUB HALVES MUST BE MAINTAINED.

- (3) Remove and discard the existing hub clamping bolt, nut, and washers from the hole counterclockwise from the blade leading edge.
- (4) Install nuts (600) and P-clips (700) onto the feed tubes (800) in accordance with Figure-10K-2 and the following steps:
  - (a) Install a nut (600) over the ferrule on the bottom end of each feed tube (800).
  - (b) Install a P-clip (700) between the 90 degree bend and the slight bend at the top of each feed tube (800) in accordance with Figure 10K-2.
- (5) Install the P-clip (700)/feed tube (800) assembly, and one washer (900) onto the bolt (1000), then insert the bolt into the hole counterclockwise from the blade leading edge in accordance with Figure 10K-3.
  - (a) Insert the feed tube (800) into the special stud (200) until it is firmly seated.
  - (b) Hand-tighten the nut (600) onto the special stud (200).
- (6) Install the washer (1100), spacer (1200), and nut (1300) on the bolt (1000) in accordance with Figure 10K-3.
  - (a) Tighten the nut (1300) until snug but do not torque at this time.
- (7) With the propeller set at 24 degrees, pull the feed tube (800) back until the P-clip (700) stops at the slight bend in the feed tube as shown in Figure 10K-3.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**103726 and 105395**

**K. Installation Instruction 10K - continued**

- (8) Align the opening of the feed tube (800) with the center channel of the anti-icing boot. Refer to Figure 10K-4.
  - (a) Using a .062" feeler gauge under the end of the feed tube (800) as shown Figure 10K-4, set the height of the feed tube (800) above the anti-ice boot.
  - (b) With the feeler gauge still in place, torque the hub clamping nut (1300) to 20-22 ft.-lbs. (27-29 N•m).
  - (c) Remove the feeler gauge, then check the alignment/height of the feed tube (800) in accordance with Figure 10K-4 and the following steps:
    - 1 Using a straight edge, check the alignment of the feed tube (800) with the center channel of the anti-ice boot.
    - 2 Measure the gap between the opening of the feed tube (800) and the anti-ice boot. The gap must be 0.030-0.090 inch (0.76-2.29 mm).
    - 3 Adjust the feed tube (800) as necessary to get proper alignment/height.

**CAUTION:** DO NOT PERMIT THE SPECIAL STUD (200) TO ROTATE WHEN TORQUING THE NUT (600). IF THE SPECIAL STUD ROTATES, LEAKAGE MAY OCCUR BETWEEN THE SLINGER RING ASSEMBLY (100), THE SPECIAL STUD (1000), AND THE SPINNER BULKHEAD.

- (9) Holding the special stud (200) to prevent rotation, use a wrench to tighten the nut (600) an additional 1/4 to 1/2 turns after snug.
- (10) Check the position/height of the feed tube (800) in accordance with Figure 10K-4 and the following steps:
  - (a) Measure from the flat surface of the hub to the end of the feed tube (800) in accordance with Figure 10K-4.
    - 1 The maximum permitted distance is 2.50 inches (63.5 mm).
  - (b) Measure the gap between the opening of the feed tube (800) and the anti-ice boot.
    - 1 The gap must be 0.030-0.090 inch (0.76-2.29 mm).
  - (c) Adjust the feed tube (800) as necessary to get proper alignment/height.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**103726 and 105395**

K. Installation Instruction 10K - continued

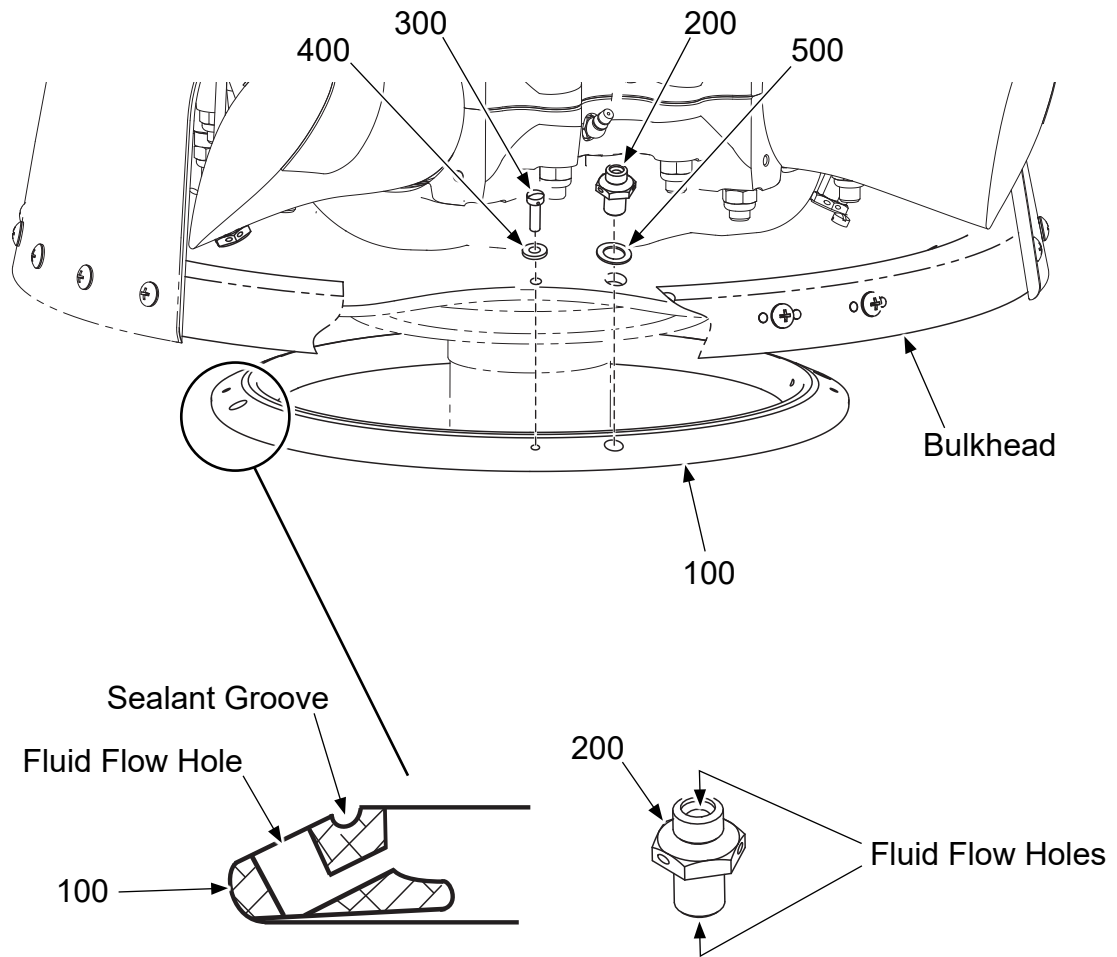
- (11) Using 0.032 inch (0.81 mm) diameter stainless steel wire, safety the nut (600) to the screws (300) and the special stud (200) in accordance with Figure 10K-4.
- (12) Repeat the installation steps for all remaining feed tubes (800).

**CAUTION:** THE FEED TUBES (800) MUST NOT CONTACT THE SPINNER DOME BLADE CUTOUT.

- (13) Put the spinner dome on the bulkhead, aligning the attaching holes.
  - (a) Check for clearance between the feed tubes (800) and the spinner dome blade cutout. The feed tubes must not contact the spinner dome blade cutout.
    - 1 Adjust the position of the feed tube(s) (800) as required.
- (14) Remove the spinner dome.
- (15) After installation of the propeller on the aircraft and installation of the spinner dome, check for clearance between the feed tubes (800) and the spinner dome blade cutouts.
  - (a) If any of the travel tubes contact the spinner dome blade cutouts, remove the propeller from the aircraft and adjust the feed tube(s) in accordance with the instructions in this section.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**103726 and 105395**

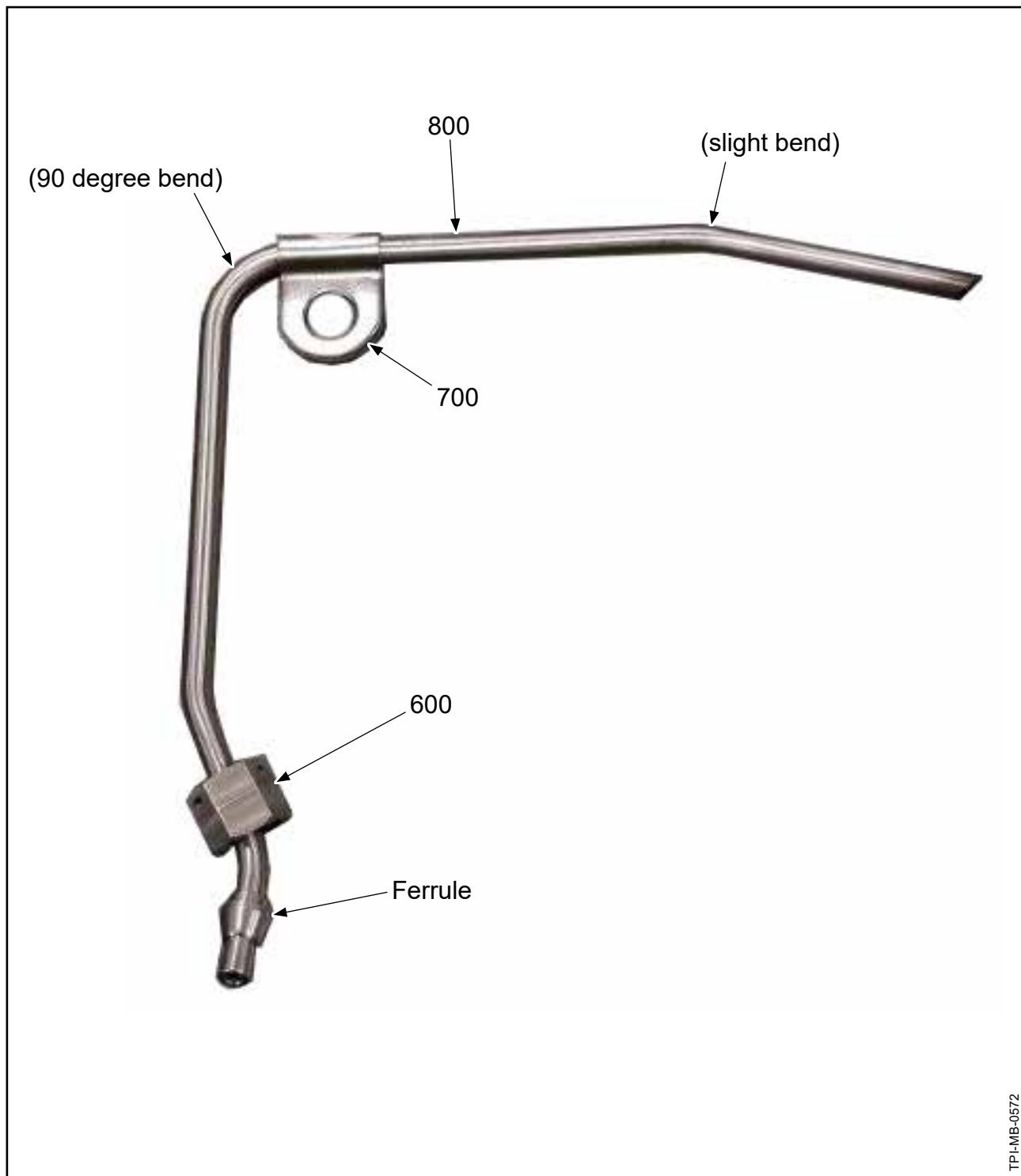


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**Installing the Slinger Ring  
Figure 10K-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**103726 and 105395**



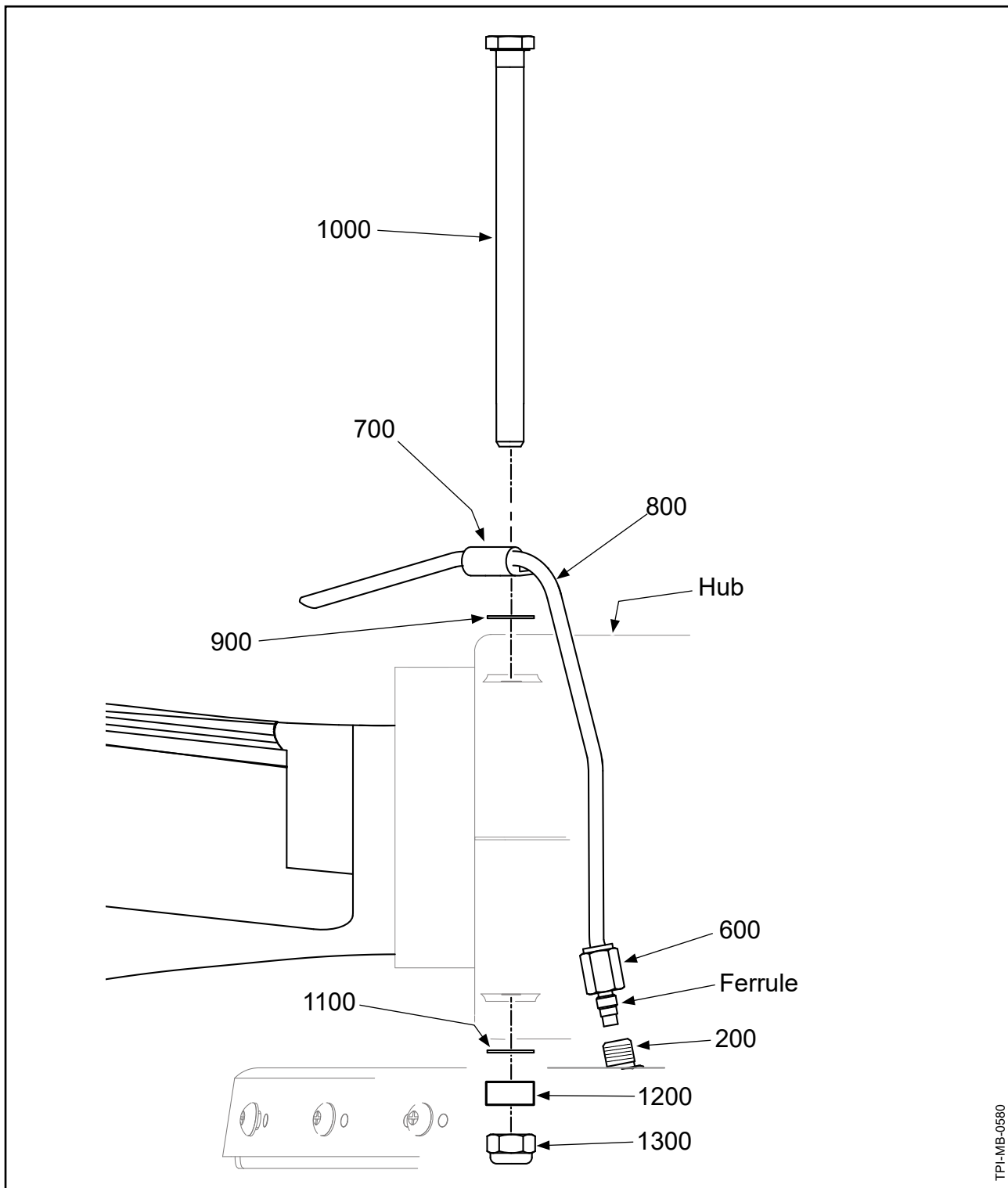
**Assembling the Feed Tube  
Figure 10K-2**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

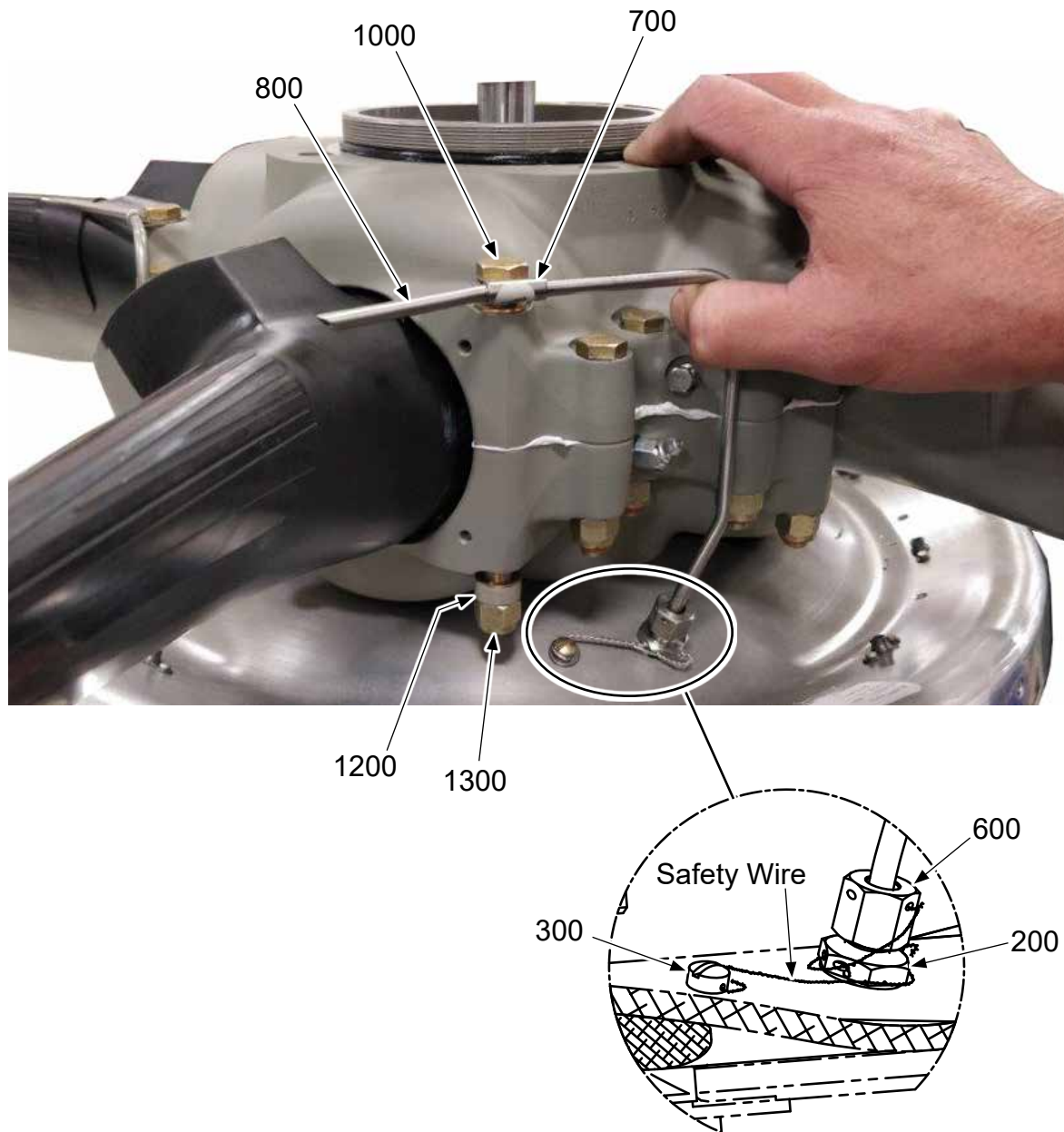
**103726 and 105395**



**Installing the Feed Tube  
Figure 10K-3, page 1 of 2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

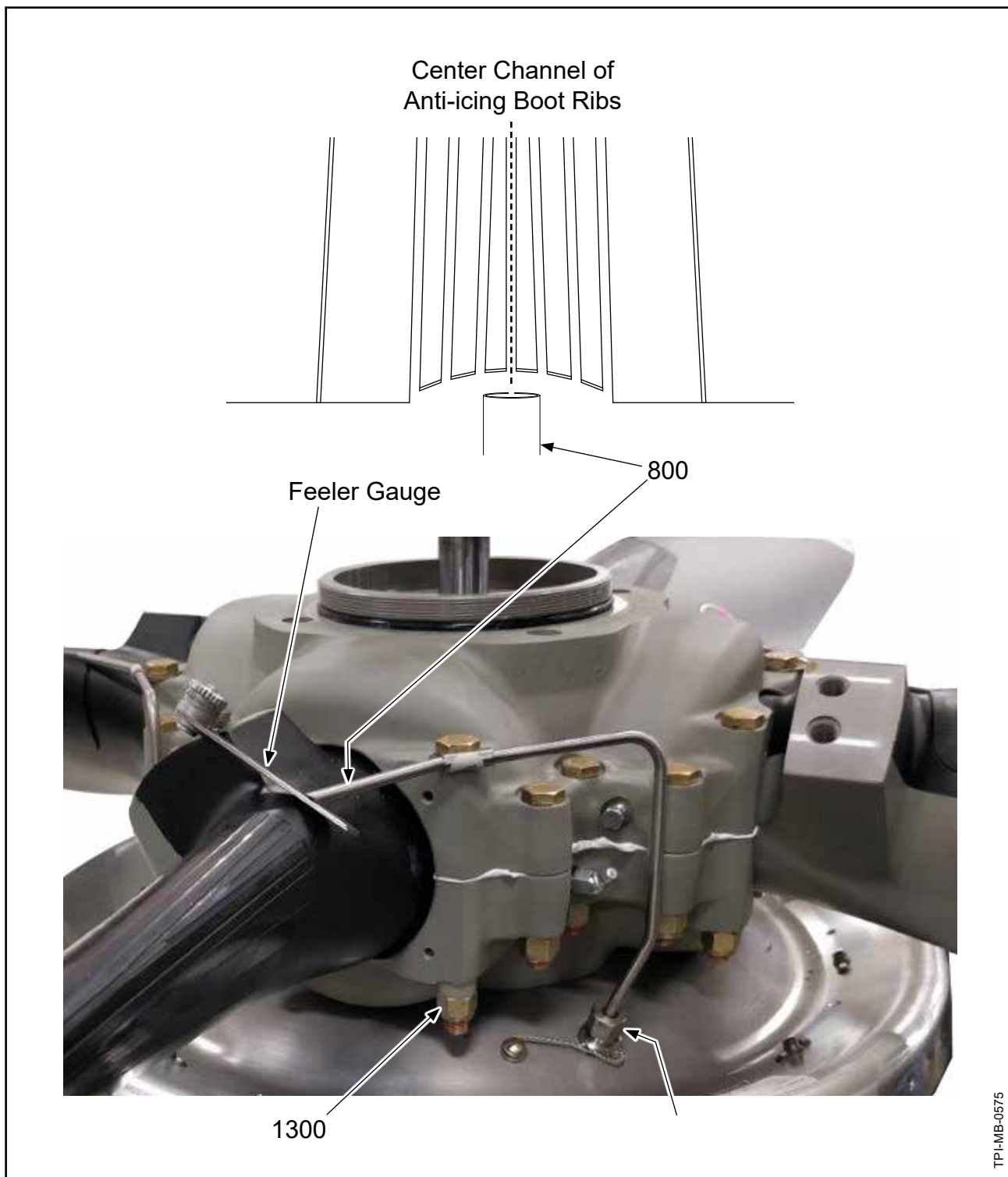
This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**103726 and 105395**



**Installing the Feed Tube  
Figure 10K-3, page 2 of 2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

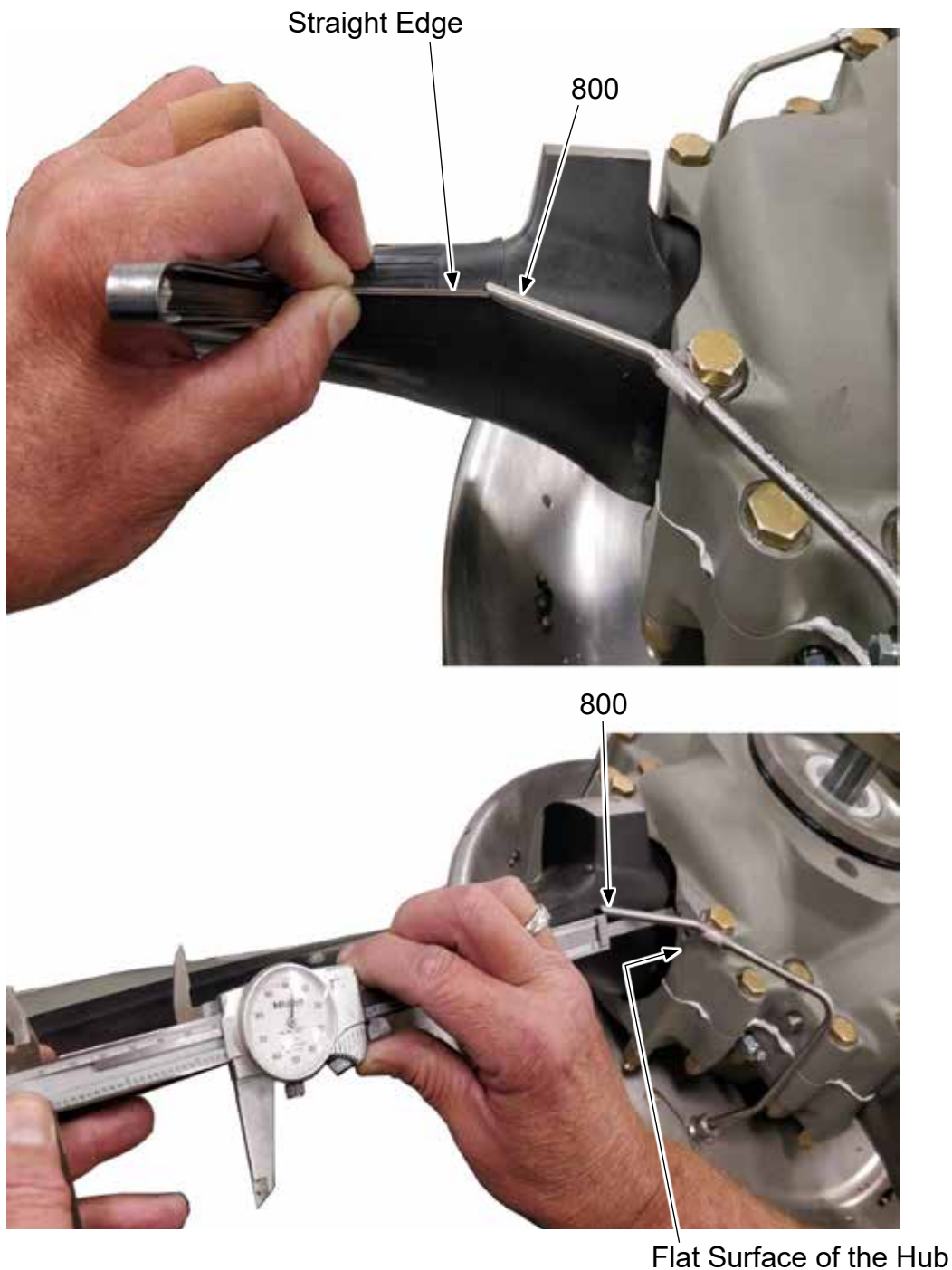
This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**103726 and 105395**



**Aligning the Feed Tube**  
**Figure 10K-4, page 1 of 2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**103726 and 105395**



TPI-MB-0576

**Aligning the Feed Tube**  
**Figure 10K-4, page 2 of 2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**103726 and 105395**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>103726</b>	<b>ANTI-ICE KIT - OBSOLETE REPLACED BY 105395</b>		
100	7931-13025-01	• SLINGER RING ASSEMBLY	1	
200	7931-13025-02	• SPECIAL STUD	4	
300	B-3840-10	• SCREW, 10-32, FILLISTER HEAD	4	
500	B-3834-0632	• WASHER, CORROSION RESISTANT	4	Y
600	7931-ZN4856	• NUT	4	
700	7931-4587-03	• P-CLIP	4	Y
800	7931-13025-05	• FEED TUBE, PROP BLADE	4	
900	B-3834-0663	• WASHER	4	Y
1000	A-2433	• BOLT, 3/8-24, HEX-HEAD	4	
1000A	102691	• BOLT, 3/8-24, HEX HEAD ALTERNATE FOR ITEM 5070, POST HC-SL-61-347	4	
1100	B-3834-0632	• WASHER, CORROSION RESISTANT	4	Y
1200	A-2246-4	• SPACER	4	
1300	A-2043-1	• NUT, HEX, SELF-LOCKING	4	Y

- ITEM NOT ILLUSTRATED

**Anti-ice Kits: 103726**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**103726 and 105395**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>105395</b>	<b>ANTI-ICE KIT</b> <b>REPLACES 103726, POST HC-SL-30-304 and HC-SB-30-352</b> <b>INSTALLATION INSTRUCTION 10K</b> <b>FIGURES: 10K-1 thru 10K-X</b>		
100	7931-13025-06	• SLINGER RING ASSEMBLY	1	
200	7931-13025-11	• SPECIAL STUD	4	
300	B-3840-10	• SCREW, 10-32, FILLISTER HEAD	4	
400	B-3837-0363	• WASHER, CORROSION RESISTANT	4	Y
500	B-3834-0632	• WASHER, CORROSION RESISTANT	4	Y
600	7931-ZN4856	• NUT	4	
700	7931-4587-03	• P-CLIP	4	Y
800	7931-13025-05	• FEED TUBE, PROP BLADE	4	
900	B-3834-0663	• WASHER	4	Y
1000	A-2433	• BOLT, 3/8-24, HEX-HEAD	4	
1000A	102691	• BOLT, 3/8-24, HEX HEAD ALTERNATE FOR ITEM 5070, POST HC-SL-61-347	4	
1100	B-3834-0632	• WASHER, CORROSION RESISTANT	4	Y
1200	A-2246-4	• SPACER	4	
1300	A-2043-1	• NUT, HEX, SELF-LOCKING	4	Y

- ITEM NOT ILLUSTRATED

**Anti-ice Kits: 105395**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**105014**

L. Installation Instruction 10L

NOTE: All instructions in this section refer to Figure 10L-1.

- (1) Align the mounting holes in the anti-ice bracket (10) with the mounting holes in the bulkhead.
  - (a) Put one washer (70) under the anti-ice bracket (10) on the same side as the travel tube mounting hole as shown in Figure 10L-1.

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

- (2) Apply Loctite 222 CM21 to the threads of two hex head bolts (20).
- (3) Install the two hex head bolts (20) and two washers (30) through the two outer mounting holes in the anti-ice bracket (10).
  - (a) Torque the two hex head bolts (20) to 96-120 In-Lbs (10.8-13.5 N•m).
- (4) Install the screw (50) from the aft-side of the bulkhead through the inner mounting hole of the anti-ice bracket (10), then install the washer (35) and the hex nut (40).
  - (a) Torque the hex nut (40) to 70-85 In-Lbs (8.0-9.6 N•m).

WARNING: ALIGNMENT OF THE TRAVEL TUBE WELDMENT (5020) TO THE ANTI-ICING BOOT CAN ONLY BE PERFORMED ON A PROPELLER BUILD BENCH CAPABLE OF SETTING BLADE ANGLE.

- (5) The fitting (60) installed on the spinner bulkhead consists of three components:
  - (a) Nut (61)
  - (b) Ferrule (62)
  - (c) Base is installed on the slinger ring assembly attached to the bulkhead assembly.
- (6) Install the nut (61) from the fitting (60) on the travel tube weldment (5020).

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**105014**

L. Installation Instruction 10L - continued

- (7) Install the ferrule (62) from the fitting (60) on the travel tube weldment (5020) with the cone side towards the end of the travel tube weldment (5020).
- (8) Apply grease CM12, to the ferrule (62), threads of the base, and the cone inside the nut (61) of the fitting (60).
- (9) Install the travel tube weldment (5020) in the base of the fitting (60) until it is firmly seated.
- (10) Hand tighten the nut (61) from the fitting (60).
- (11) Using screw (5260) and nut (5270), attach the travel tube weldment (5020) to the anti-ice bracket (10).
  - (a) Tighten the nut (5270) until snug, but do not torque at this time.
- (12) With the propeller blade angle at 24.5 degrees, align the opening of the travel tube weldment (5020) with the center channel of the anti-icing boot.
  - (a) Refer to Figure 10L-1 for the gap between the opening of the travel tube weldment (5020).
- (13) Repeat steps (1) through (12) for all remaining anti-ice brackets (10) and travel tube weldments (5020).

**CAUTION:** DO NOT PERMIT THE TRAVEL TUBE WELDMENT (5020)  
TO TOUCH THE SPINNER DOME BLADE CUTOUT.

- (14) Put the spinner dome on the bulkhead aligning the attaching holes.
  - (a) Check for clearance between the travel tube weldment (5020) and the spinner dome blade cutout.
  - (b) The travel tube weldment (5020) must not touch the spinner dome blade cutout.
  - (c) Adjust the travel tube weldment (5020) if necessary.

**NOTE:** The travel tube mounting hole in the anti-ice bracket (10)  
is oversized to allow adjustment of the travel tube  
weldment (5020).

- (15) Remove the spinner dome.

**CAUTION:** BECAUSE THE TRAVEL TUBE WELDMENT (5020) MAY ROTATE  
DURING THE TORQUE PROCESS, CHECK THE ALIGNMENT OF  
THE TRAVEL TUBE WELDMENT AFTER TORQUING.

- (16) Torque the nut (5270) 20-25 In-Lbs (2.3-2.8 N•m).



This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

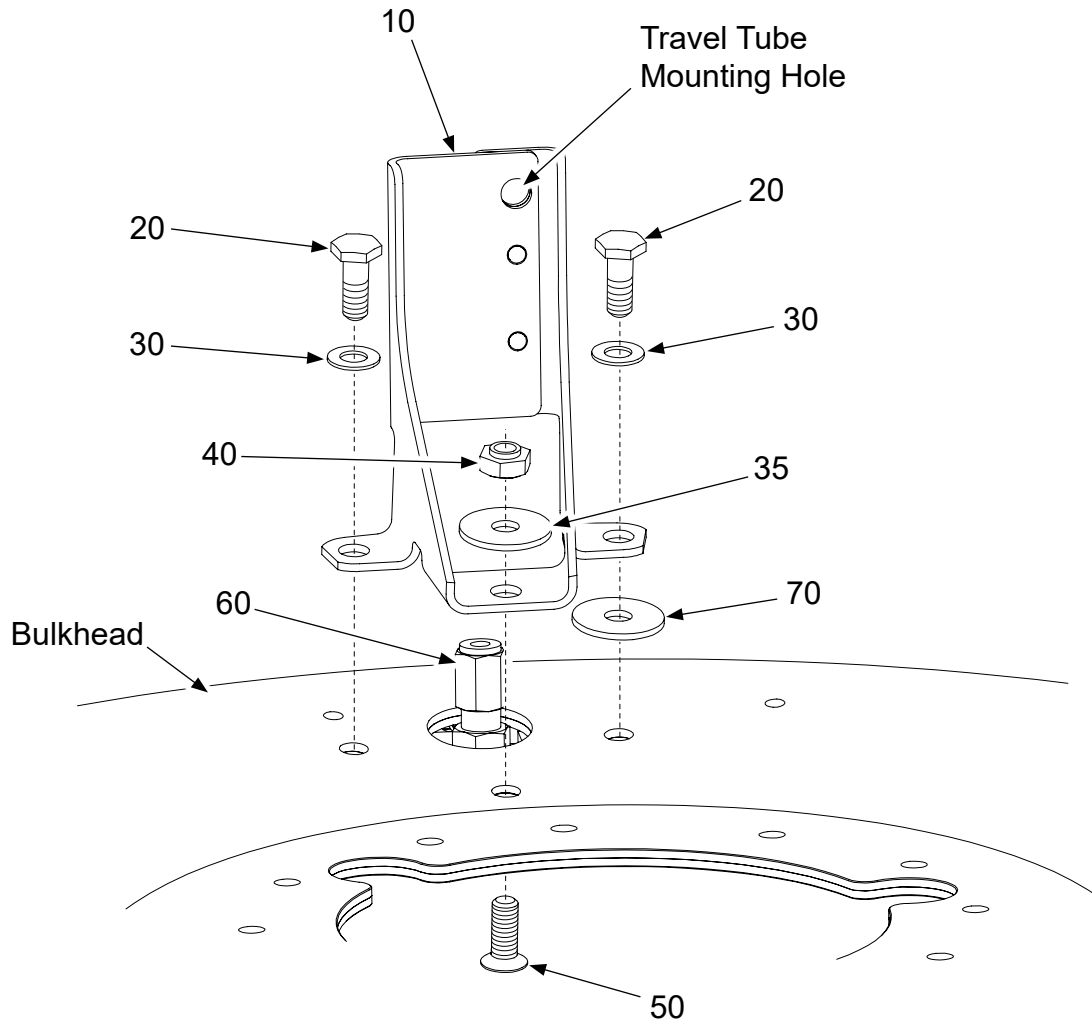
**105014**

L. Installation Instruction 10L - continued

- (17) Make an alignment mark on the nut (61) and the base of the fitting (60).
- (18) Holding the base from the fitting (60) to prevent rotation, use a wrench to tighten the nut (61) of the fitting (60) an additional 1 and 3/4 turns from the alignment mark.
  - (a) If the nut (61) is removed before final installation, install the cap and hand tighten.
    - 1 Holding the base of the fitting (60) to prevent rotation, use a wrench to tighten the nut (61) of the fitting (60) an additional 1/3 or 1/2 turns from the alignment mark.
- (19) After installation of the propeller on the aircraft and installation of the spinner dome, check for clearance between the travel tubes (5020) and the spinner dome blade cutouts.
  - (a) If any of the travel tubes contact the spinner dome blade cutouts, remove the propeller from the aircraft and adjust the travel tube(s) in accordance with the instructions in this section.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**105014**



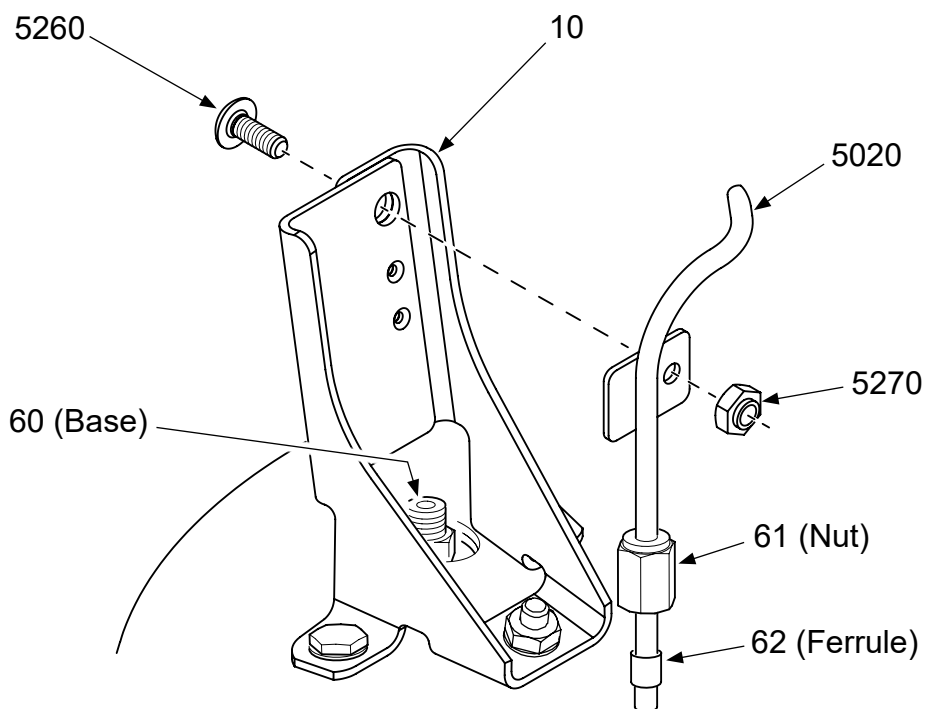
TPL-MB-0114

**Anti-ice Installation  
Figure 10L-1, Page 1 of 3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

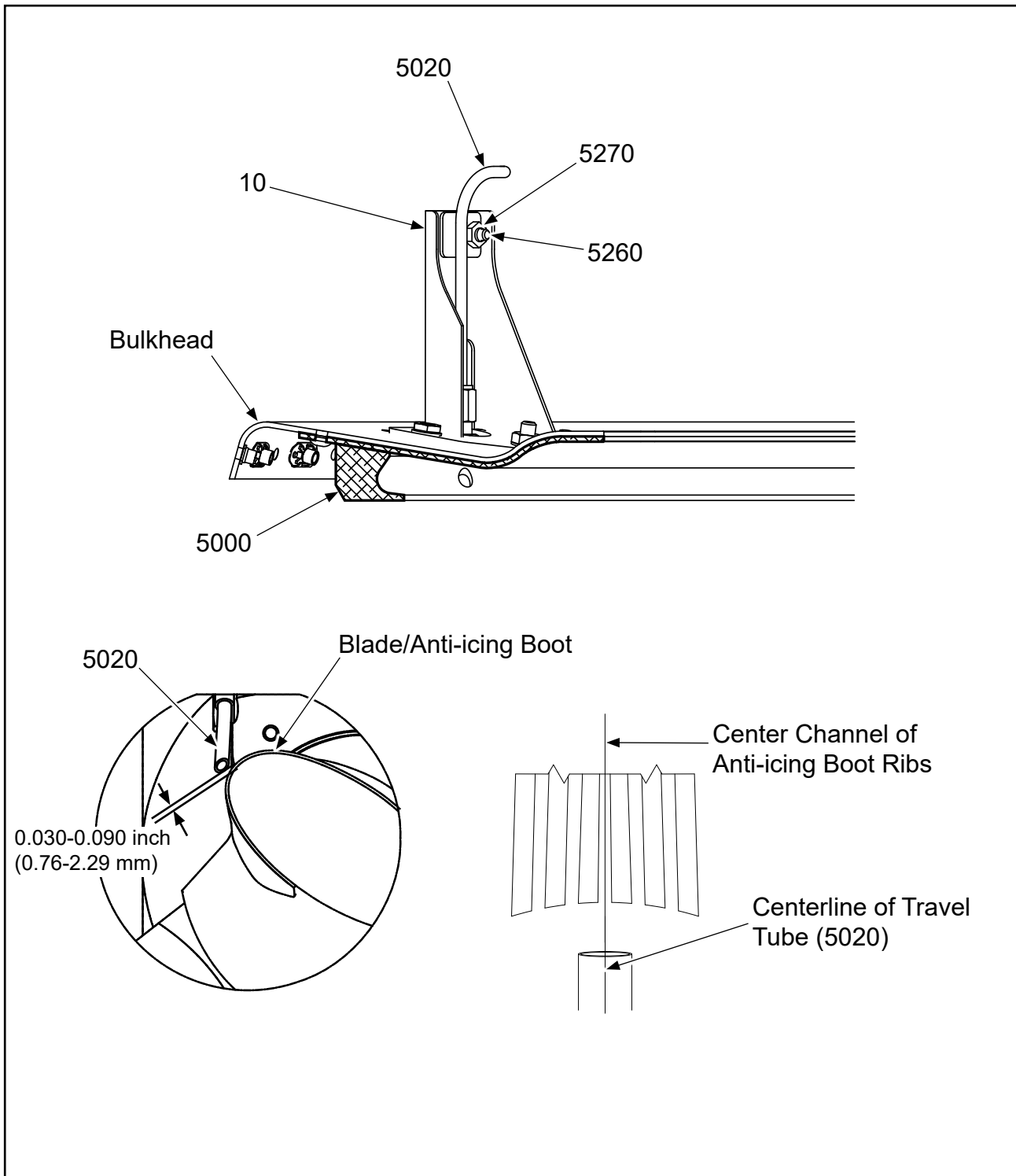
This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**105014**



**Anti-ice Installation  
Figure 10L-1, Page 2 of 3**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**105014**



**Anti-ice Installation**  
**Figure 10L-1, Page 3 of 3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**105014**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>105014</b>	<b>ANTI-ICE KIT INSTALLATION INSTRUCTION 10L FIGURES: 10L-1</b>		
10	104714	WELDMENT, BRACKET REPLACED BY ITEM 10A	3	
10A	106107	BRACKET, ANTI-ICE REPLACES ITEM 10, POST HC-ASB-30-358	3	
20	B-3384-4	BOLT, 1/4-28 HEX HEAD	6	Y
30	B-3837-0432	WASHER, CORROSION RESISTANT	6	Y
35	B-3837-0432	WASHER, CORROSION RESISTANT REPLACED BY ITEM 35A, PRE HC-ASB-61-358 USED WITH ITEM 10	3	Y
35A	106118	WASHER, 1/4", .875 OD REPLACES ITEM 35, POST HC-ASB-61-358 USED WITH ITEMS 10A	3	Y
40	B-3808-4	NUT, HEX, SELF-LOCKING	3	Y
50	104789	SCREW, 1/4-28, 100° HEAD	3	Y
70	106118	WASHER, 1/4", .875 OD USED WITH ITEM 10A	3	Y
5020	104716	• WELDMENT, TRAVEL TUBE	3	
5260	B-3845-7	• SCREW, 10-32, TRUSS HEAD	3	Y
5270	B-3808-3	• NUT, HEX, SELF-LOCKING	3	Y
		THE FOLLOWING ITEMS ARE COMPONENTS OF THE APPLICABLE BULKHEAD UNIT. THESE PARTS ARE LISTED FOR REFERENCE ONLY.		
60	104748	FITTING, 3/16, FERULOK	3	
61	107167	• NUT, 3/16, FERULOK, SS	1	
62	107168	• FERRULE, 3/16, FERULOK, SS	1	
5000	104749	RING, SLINGER, CESSNA 208 USED WITH 104744(P) BULKHEAD	1	
5000A	106108	RING, SLINGER, CESSNA 208 USED WITH 106109(P) BULKHEAD	1	

- ITEM NOT ILLUSTRATED

**Anti-ice Kit: 105014**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**105014**

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This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**107016**

**M. Installation Instruction 10M**

**WARNING:** ALIGNMENT OF THE TRAVEL TUBE WELDMENT (5020) TO THE ANTI-ICING BOOT CAN ONLY BE PERFORMED ON A PROPELLER BUILD BENCH CAPABLE OF SETTING BLADE ANGLE.

- (1) The fitting (60) installed on the spinner bulkhead consists of three components:
  - (a) Nut (61)
  - (b) Ferrule (62)
  - (c) Base

**NOTE:** The base is installed on the slinger ring assembly attached to the bulkhead assembly.

- (2) Install the nut (61) from the bulkhead fitting (60) onto the travel tube (5020).
- (3) Install the ferrule (62) from the bulkhead fitting (60) onto the travel tube (5020) with the cone side towards the slinger ring-end of the travel tube.
- (4) Apply grease CM12, to the ferrule (62), threads of the base, and the cone inside the nut (61) of the bulkhead fitting (60).
- (5) Install the clamp (5265) onto the travel tube (5020).
- (6) Using the bolt (5000), washers (5010 and 5040), spacer (5030), and the existing hub clamping washer and nut, attach the clamp (5265) to the hub in accordance with Figure 10M-1.
  - (a) Do not tighten the hub clamping nut at this time.
- (7) With the propeller blade angle at 35 degrees, align the opening of the travel tube (5020) with the center channel of the anti-icing boot.
  - (a) Adjust the travel tube (5020) to get the correct gap between the opening of the travel tube and the anti-icing boot as shown in Figure 10M-2.

**CAUTION:** THE TRAVEL TUBE (5020) MAY ROTATE DURING THE TORQUE PROCESS, CHECK ALIGNMENT OF THE TRAVEL TUBE UNIT AFTER TORQUING.

- (b) Torque the hub clamping nut 20-25 In-Lbs (2.3-2.8 N•m).

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**107016**

M. Installation Instruction 10M - continued

(8) Repeat the installation steps for all remaining travel tubes (5020).

**CAUTION: THE TRAVEL TUBE (5020) MUST NOT CONTACT THE SPINNER  
DOME BLADE CUTOUT.**

(9) Put the spinner dome on the bulkhead, aligning the attaching holes.

(a) Check for clearance between the travel tubes (5020) and the spinner dome blade cutout. The travel tubes must not contact the spinner dome blade cutout.

1 Adjust the position of the travel tube(s) (5020) as required.

(10) Remove the spinner dome.

(11) Make an alignment mark on the nut (61) and base of the bulkhead fitting (60).

(12) Holding the base of the bulkhead fitting (60) to prevent rotation, use a wrench to tighten the nut (61) an additional 1 and 3/4 turns from the alignment mark.

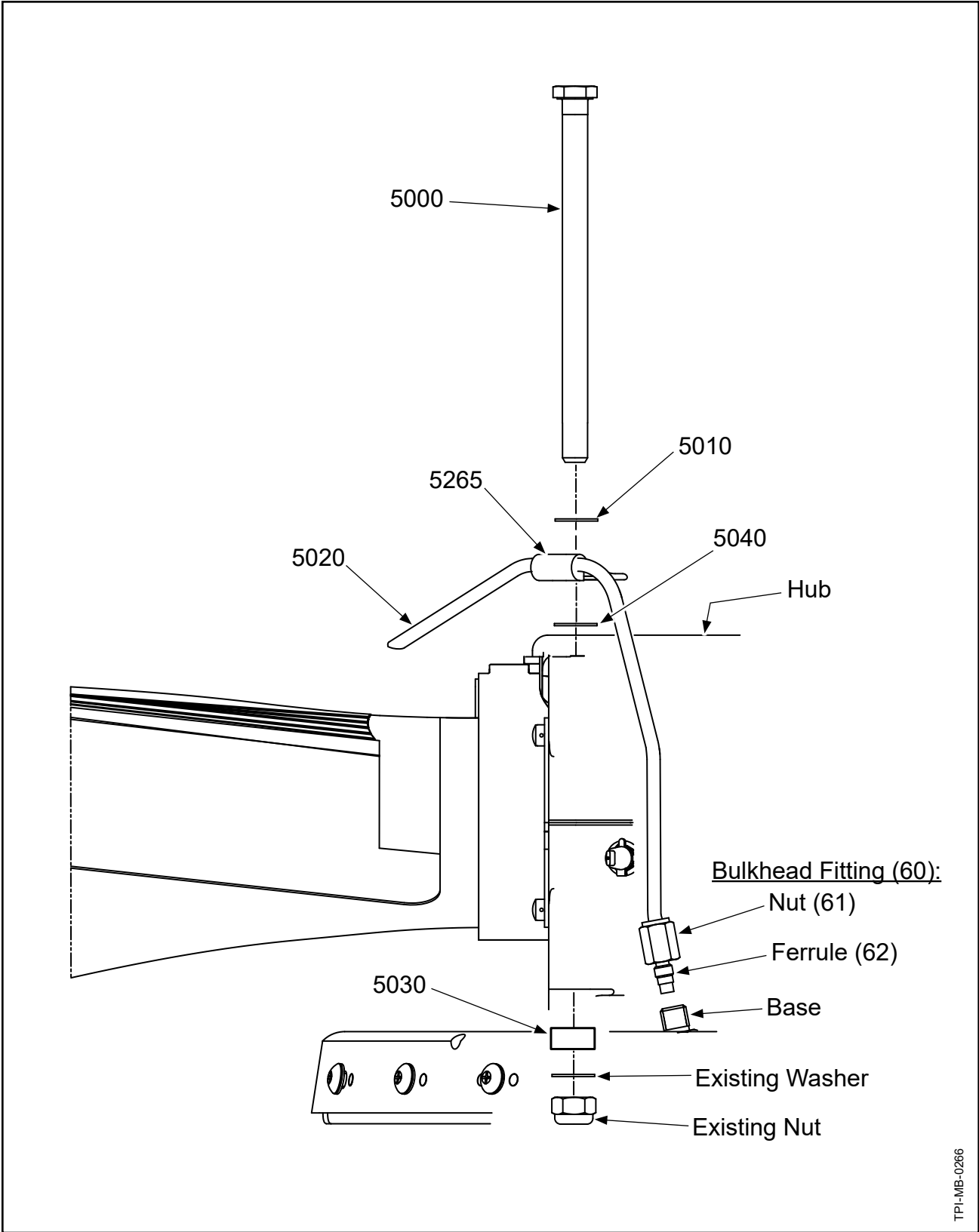
(a) If the nut (61) is removed before final installation, install the nut (61) and hand tighten.

1 Holding the base of the bulkhead fitting (60) to prevent rotation, use a wrench to tighten the nut (61) an additional 1/3 to 1/2 turn.

(13) After installation of the propeller on the aircraft and installation of the spinner dome, check for clearance between the travel tubes (5020) and the spinner dome blade cutouts.

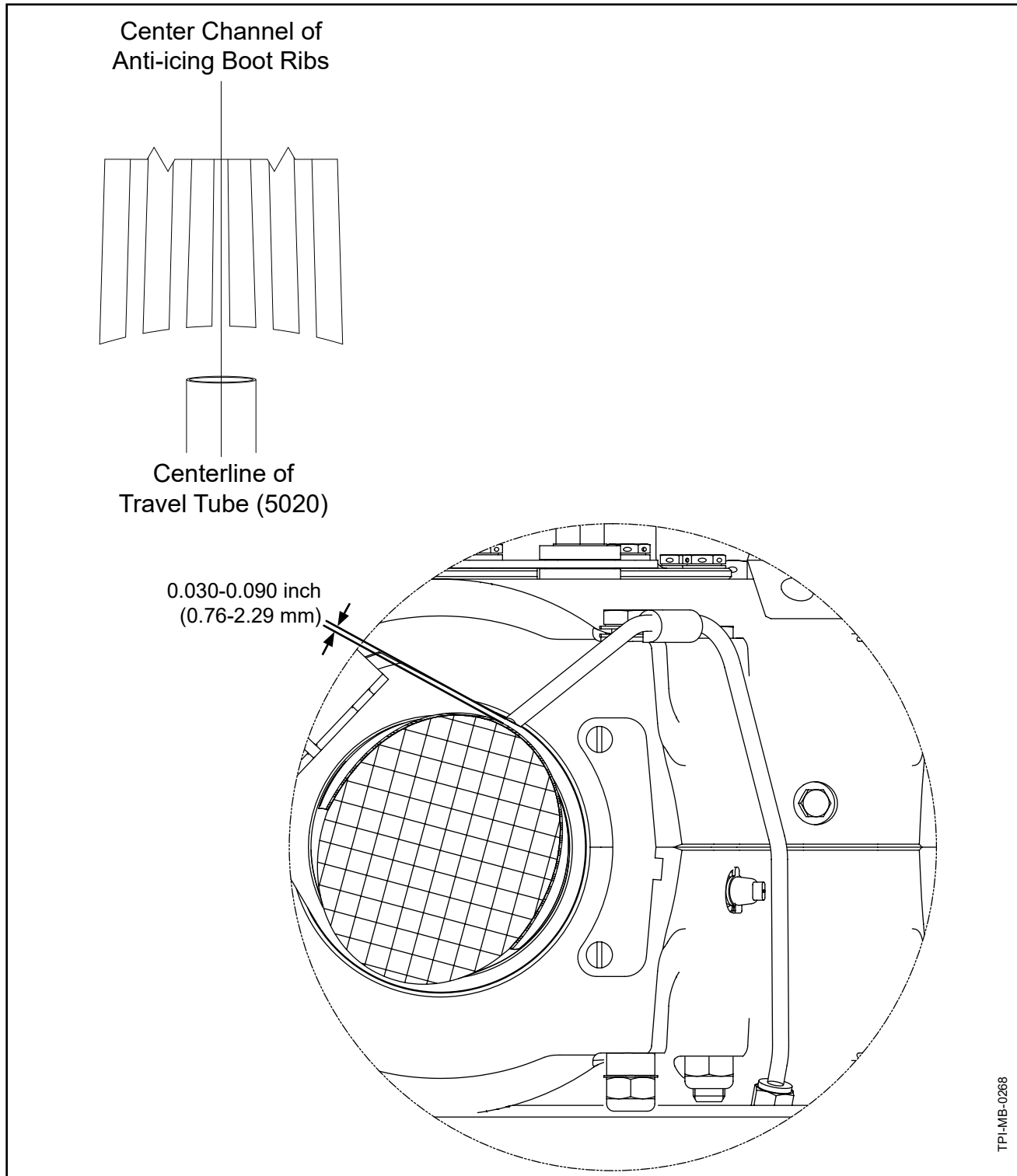
(a) If any of the travel tubes contact the spinner dome blade cutouts, remove the propeller from the aircraft and adjust the travel tube(s) in accordance with the instructions in this section.





Anti-ice Installation  
Figure 10M-1

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**107016**



**Anti-ice Installation  
Figure 10M-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**107016**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>107016</b>	<b>ANTI-ICE KIT INSTALLATION INSTRUCTIONS 10M FIGURES: 10M-1 and 10M-2</b>		
5000	A-3219-1	• BOLT, 3/8-24, HEX HEAD REPLACED BY ITEM 5000A	5	
5000A	107083	• BOLT, 3/8-24, HEX HEAD REPLACES ITEM 5000	5	
5010	B-3834-0632	• WASHER	5	Y
5020	107012	• TRAVEL TUBE	5	
5030	A-2246	• SPACER, ALUMINUM REPLACED BY ITEM 5030A	5	
5030A	A-2246-4	• SPACER, ALUMINUM REPLACES ITEM 5030	5	
5040	B-3834-0663	• WASHER	5	Y
5265	107011-54	• CLAMP, SINGLE LOOP	5	Y
		ITEMS 60, 61, AND 62 ARE COMPONENTS OF THE APPLICABLE BULKHEAD UNIT. THESE PARTS ARE LISTED FOR REFERENCE ONLY.		
60	104748	FITTING, 3/16, FERULOK	5	
61	107167	• NUT, 3/16, FERULOK, SS	1	
62	107168	• FERRULE, 3/16, FERULOK, SS	1	

- ITEM NOT ILLUSTRATED

**Anti-ice Kit: 107016**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**107016**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**107458**

**N.     Installation Instruction 10N**

- (1) Install the slinger ring (5000) in accordance with Figure 10N-1 and the following steps:
  - (a) Install one sealing washer (100) onto each fluid transfer fitting (200).
  - (b) Put the three fluid transfer fittings (200) through the holes in the slinger ring (5000).
  - (c) Put one sealing washer (100), aluminum spacer (300), and one washer (400) onto each fluid transfer fitting (200).
  - (d) Put the fluid transfer fittings (200) through the holes in the bulkhead, then install one washer (400) and hex nut (500) onto each fluid transfer fitting.
    - 1     Torque each hex nut (500) to 10-12 Ft-Lbs (13.6-16.2 N•m).
- (2) Install the balance ring (1100) in accordance with the Assembly chapter in the applicable Hartzell Propeller overhaul/maintenance manual.
- (3) Install the travel tubes (5020) in accordance with Figure 10N-1 and the following steps:
  - (a) Install one ferulok nut (600) onto each travel tube (5020).
  - (b) Install one ferrule (700) onto each travel tube (5020) with the cone-side of the ferrule positioned toward the slinger ring-end of the travel tube as shown in Figure 10N-1.
  - (c) Apply grease CM12, to each ferrule (700) and to the exposed threads of the fluid transfer fittings (200).
  - (d) Push the travel tube (5020) into the fluid transfer tube fitting (5020) until it is firmly seated, then hand-tighten the ferulok nut (600) onto the fluid transfer tube fitting.
    - 1     Repeat this step for each travel tube (5020).
  - (e) Install one clamp (800) around each travel tube (5020), then loosely attach the clamps to the propeller balance ring (1100) using screws (900) and hex nuts (1000).
    - 1     Do not tighten at this time.
  - (f) Make sure the travel tube (5020) is firmly seated in the fluid transfer fitting (200), then make an alignment mark on the fluid transfer fitting and the ferulok nut (600) for each travel tube.
  - (g) While holding the fluid transfer fitting (200) to prevent rotation, use a wrench to tighten each ferulok nut (600) 1-3/4 turns from the alignment mark.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**107458**

**N. Installation Instruction 10N - continued**

(3) With the propeller blades set at the start lock angle, align the opening of the travel tubes (5020) with the second rib from the center channel of the anti-ice boot on the camber-side of the blade as shown in Figure 10N-2.

(a) Adjust the travel tube (5020) to get the correct gap between the opening of the travel tube and the anti-icing boot as shown in Figure 10N-2..

**CAUTION: THE TRAVEL TUBE (5020) MUST NOT CONTACT THE SPINNER  
DOME BLADE CUTOUT.**

(4) Put the spinner dome on the bulkhead, aligning the attaching holes.

(5) Check for clearance between the travel tubes (5020) and the spinner dome blade cutout. The travel tubes must not contact the spinner dome blade cutout.

(a) Adjust the position of the travel tube(s) (5020) as required.  
Do not bend the clamp (900).

(b) If the ferulok nut (600) is loosened or removed to adjust the travel tube (5020), retighten the ferulok nut in accordance with the following steps:

1 Hand-tighten the ferulok nut (600) onto the fluid transfer tube fitting (200).

2 While holding the fluid transfer fitting (200) to prevent rotation, use a wrench to tighten the ferulok nut (600) an additional 1/3 to 1/2 turn.

(6) While holding the travel tubes (5020) and clamps (800) in position, torque the hex nuts (1000) to 57-63 In-Lbs (6.5-7.1 N•m).

(7) After installation of the propeller on the aircraft and installation of the spinner dome, check for clearance between the travel tubes (5020) and the spinner dome blade cutouts.

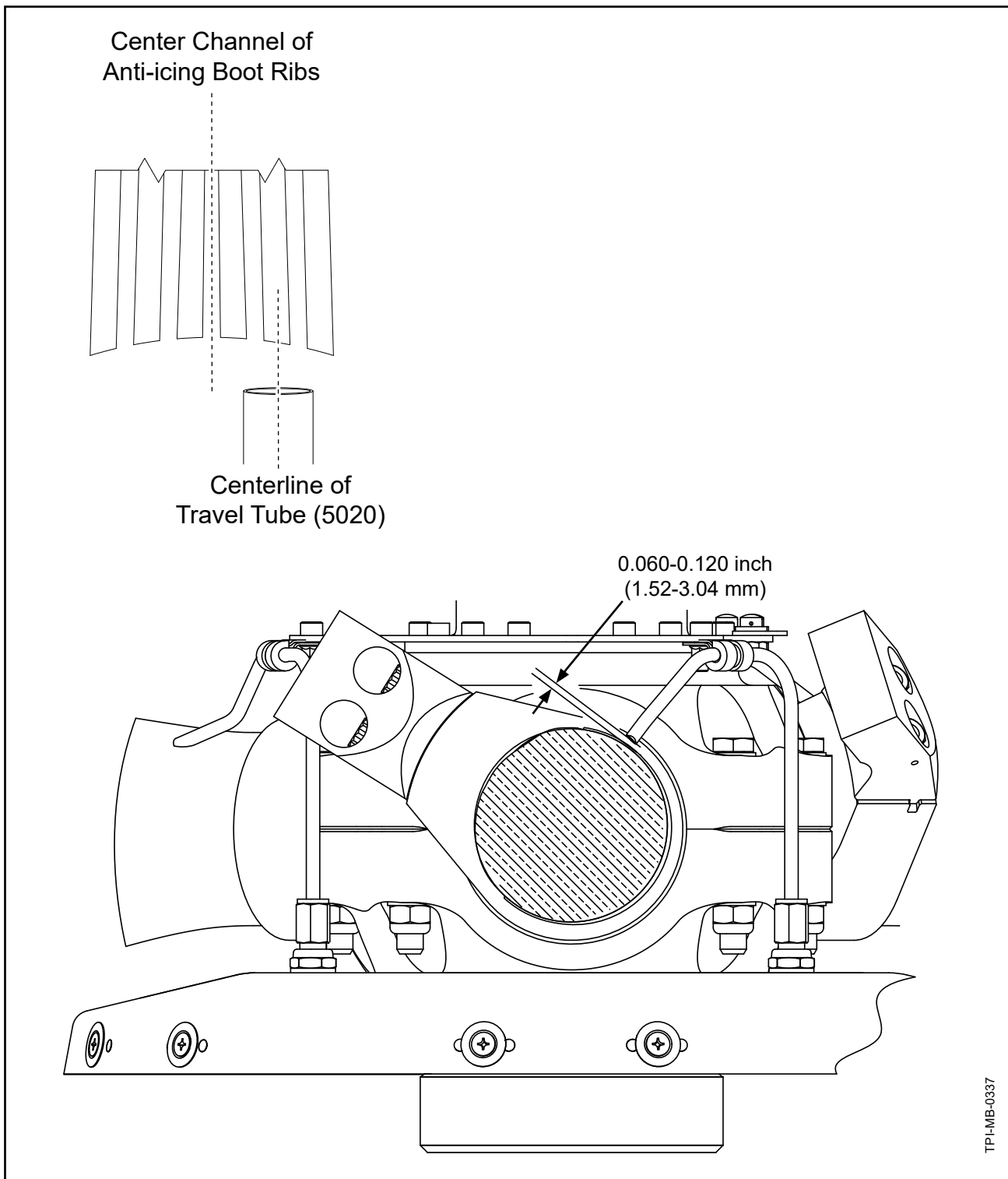
(a) If any of the travel tubes contact the spinner dome blade cutouts, remove the propeller from the aircraft and adjust the travel tube(s) in accordance with the instructions in this section.



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**107458**



**Travel Tube/Anti-ice Boot Alignment  
Figure 10N-2**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**107458**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>107458</b>	<b>ANTI-ICE KIT INSTALLATION INSTRUCTION 10N FIGURES: 10N-1 and 10N-2</b>		
100	107156	WASHER, SEALING	6	
200	107212	FITTING, FLUID TRANSFER	3	
300	A-2246-3	SPACER, ALUMINUM	3	
400	B-3834-0663	WASHER	6	Y
500	B-3359	NUT, 3/8-24, HEX, SELF-LOCKING	3	Y
600	107167	NUT, 3/16, FERULOK	3	
700	107168	FERRULE, 3/16, FERULOK	3	
800	B-3857-WDG3	CLAMP, LOOP, CUSHIONED	3	
900	A-2626-2	SCREW, 10-32, CAP	3	Y
1000	B-3869-3	NUT, SELF-LOCKING	3	
1100	107154	RING, BALANCE	1	
5000	107267	RING, SLINGER	1	
5020	107214	TRAVEL TUBE	3	

- ITEM NOT ILLUSTRATED

**Anti-ice Kit: 107458**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**107458**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**107638**

O. Installation Instruction 100

- (1) Install the bulkhead to the propeller in accordance with the applicable Hartzell Propeller owner's manual.
  - (a) Do not torque the hub clamping bolt located at the blade socket counterclockwise (viewed from the cylinder-side) from the blade leading edge at this time.
- (2) OPTIONAL: Apply threadlocker CM116 to the screws (100).
- (3) Using the screws (100) and dimpled washers (200), attach the slinger ring assembly (400) to the hub in accordance with Figure 10O-1.
  - (a) Torque the screws (100) to 18-22 In-Lbs (2.1-2.4 N•m).
- (4) The 90° elbow fittings (410) installed on the slinger ring (400) include the ferrule (415) and nut (420) shown in Figure 10O-2.
- (5) Remove the nut (420) and the ferrule (415) from the 90° elbow fitting (410).
  - (a) Apply grease CM12, to the ferrule (415), the external threads of the 90° elbow fitting (410), and the cone inside the nut (420).
  - (b) Insert the ferrule (415) with cone-side down, into the 90° elbow fitting (410) as shown in Figure 10O-2, then loosely install the nut (420).
- (6) Install the existing hub clamping bolt, washer, spacer, and washer (300) in accordance with Figure 10O-2.
- (7) Slide the clamp (600) onto the travel tube (500) as shown in Figure 10O-2.
- (8) Insert the travel tube (500) into the nut (420) until it is firmly seated while putting the clamp (600) onto the hub clamping bolt in accordance with Figure 10O-2.
  - (a) Install the existing washer and nut, but do not tighten hub clamping bolt/nut at this time.
  - (b) Hand-tighten the nut (420) onto the 90° elbow fitting (410).
  - (c) Make an alignment mark on the nut (420) and the 90° elbow fitting (410).
- (9) Holding the base of the 90° elbow fitting (410) to prevent rotation, use a wrench to tighten the nut (420) an additional 1 and 3/4 turns from the alignment mark.
  - (a) If the nut (420) is removed before final installation, install the nut (420) and hand tighten.
    - 1 Holding the base of the 90° elbow fitting (410) to prevent rotation, use a wrench to tighten the nut (420) an additional 1/3 to 1/2 turn.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**107638**

O. Installation Instruction 10O - continued

(10) With the propeller blades set at low blade angle, align the left edge of the travel tube (500) with the right edge of channel #3 on the anti-icing boot as shown in Figure 10O-3.

(a) Adjust the travel tube (500) to get the correct gap between the opening of the travel tube and the anti-icing boot as shown in Figure 10O-3.

(11) Put the spinner dome on the bulkhead, aligning the mounting holes.

**CAUTION:** THE TRAVEL TUBE (500) MUST NOT CONTACT THE SPINNER DOME BLADE CUTOUT.

(a) Check for clearance between the travel tubes (500) and the spinner dome blade cutout.

1 There must be at least 0.080 in (2.03 mm) clearance between the travel tubes and the spinner dome blade cutout.

2 Adjust the position of the travel tube(s) (500) to get the required clearance.

(b) Remove the spinner dome.

**CAUTION 1:** CHECK ALIGNMENT OF THE TRAVEL TUBE (500) AFTER TORQUING.

**CAUTION 2:** CONTACT BETWEEN THE TRAVEL TUBE (500) AND THE HUB IS NOT PERMITTED. MAINTAIN CLEARANCE BETWEEN THE TRAVEL TUBE AND THE HUB AS SHOWN IN FIGURE 10O-3.

(12) Torque the hub clamping nut 24-26 Ft-Lbs (33-35 N•m).

(13) Repeat the installation steps for all remaining travel tubes (500).

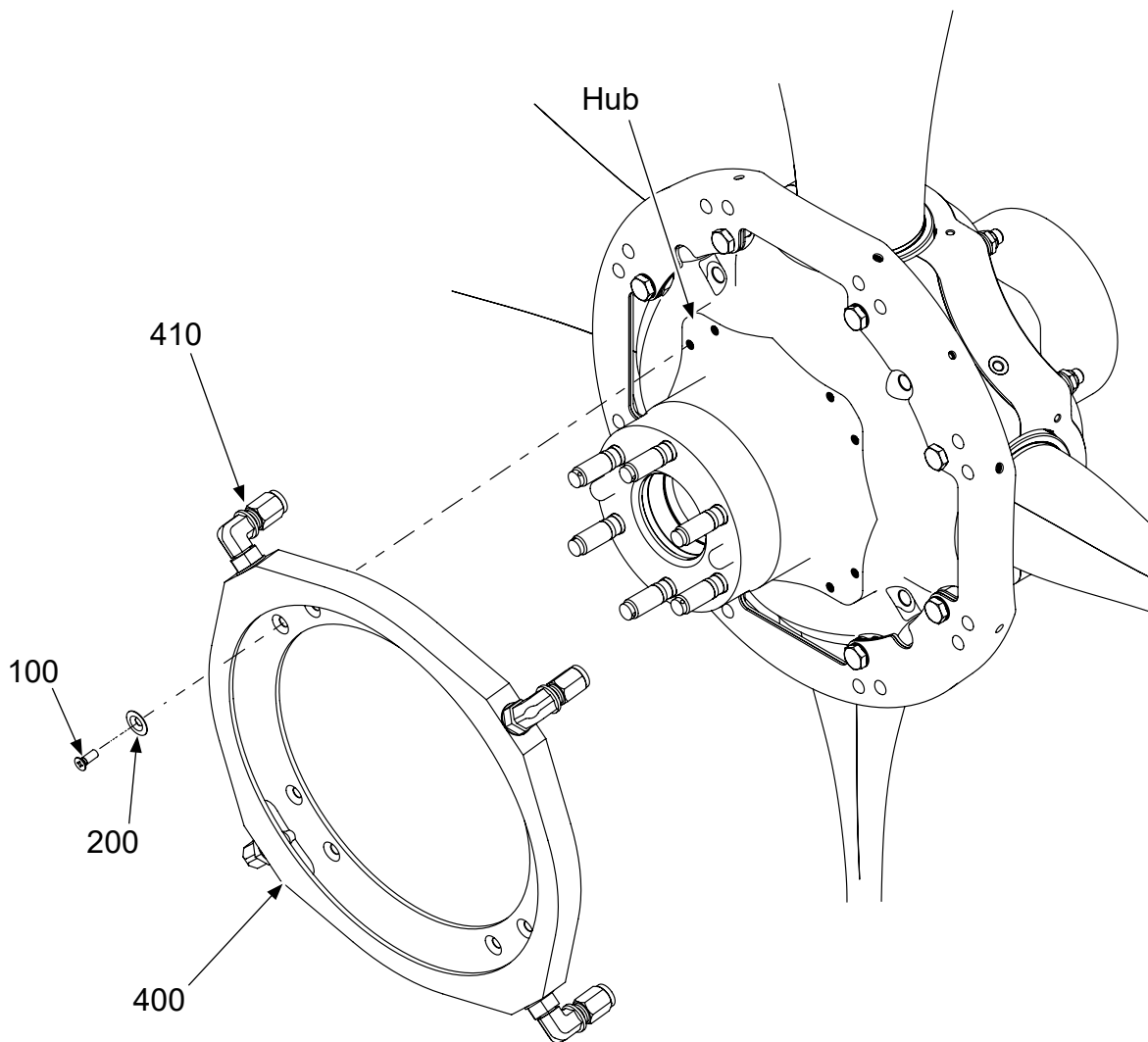
(14) After installation of the propeller on the aircraft and installation of the spinner dome, check for clearance between the travel tubes (500) and the spinner dome blade cutouts.

(a) If the clearance is less than 0.080 in. (2.03 mm), remove the spinner dome and adjust the travel tube(s) in accordance with the instructions in this section.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**107638**



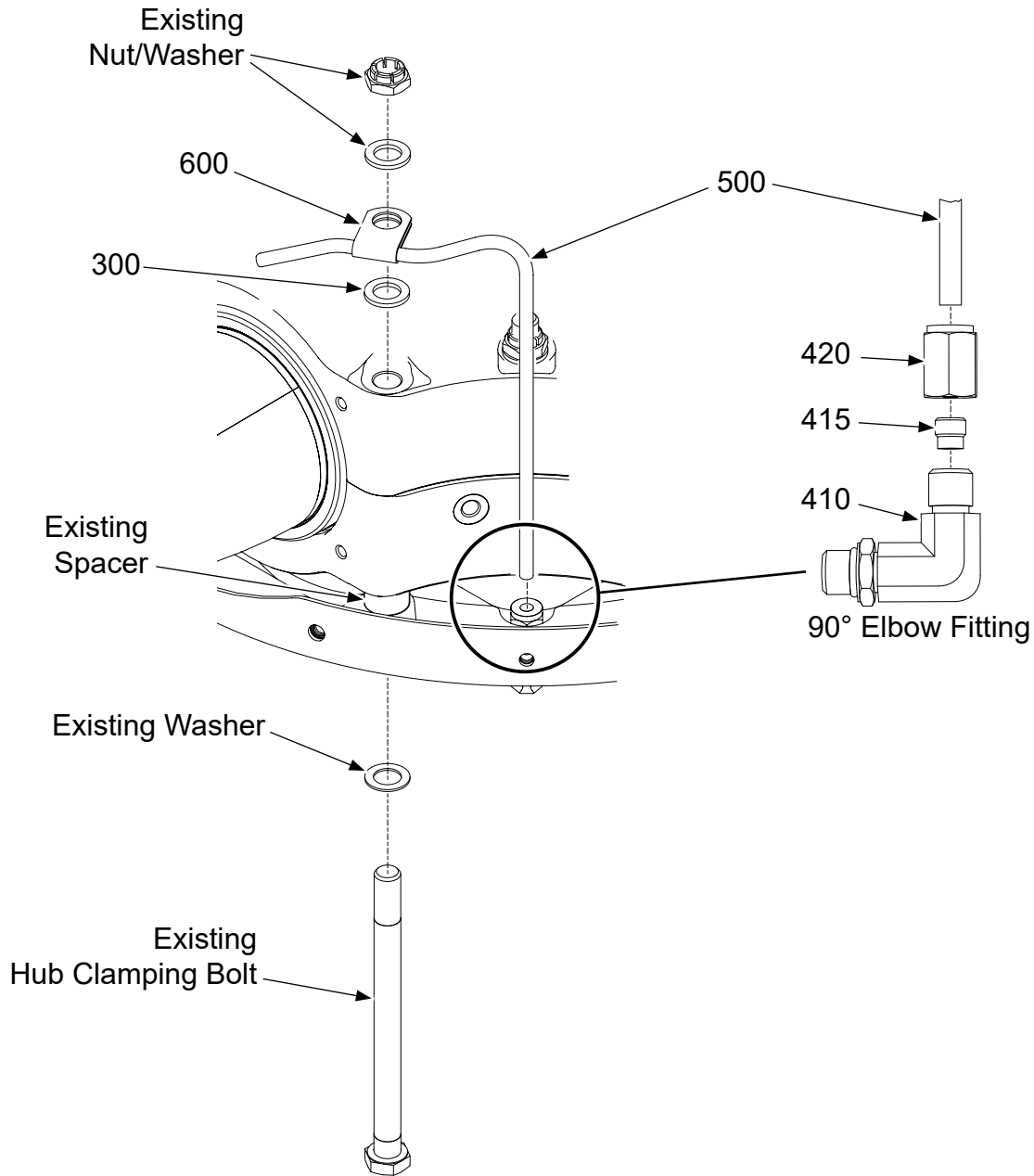
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**Slinger Ring Installation  
Figure 100-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**107638**



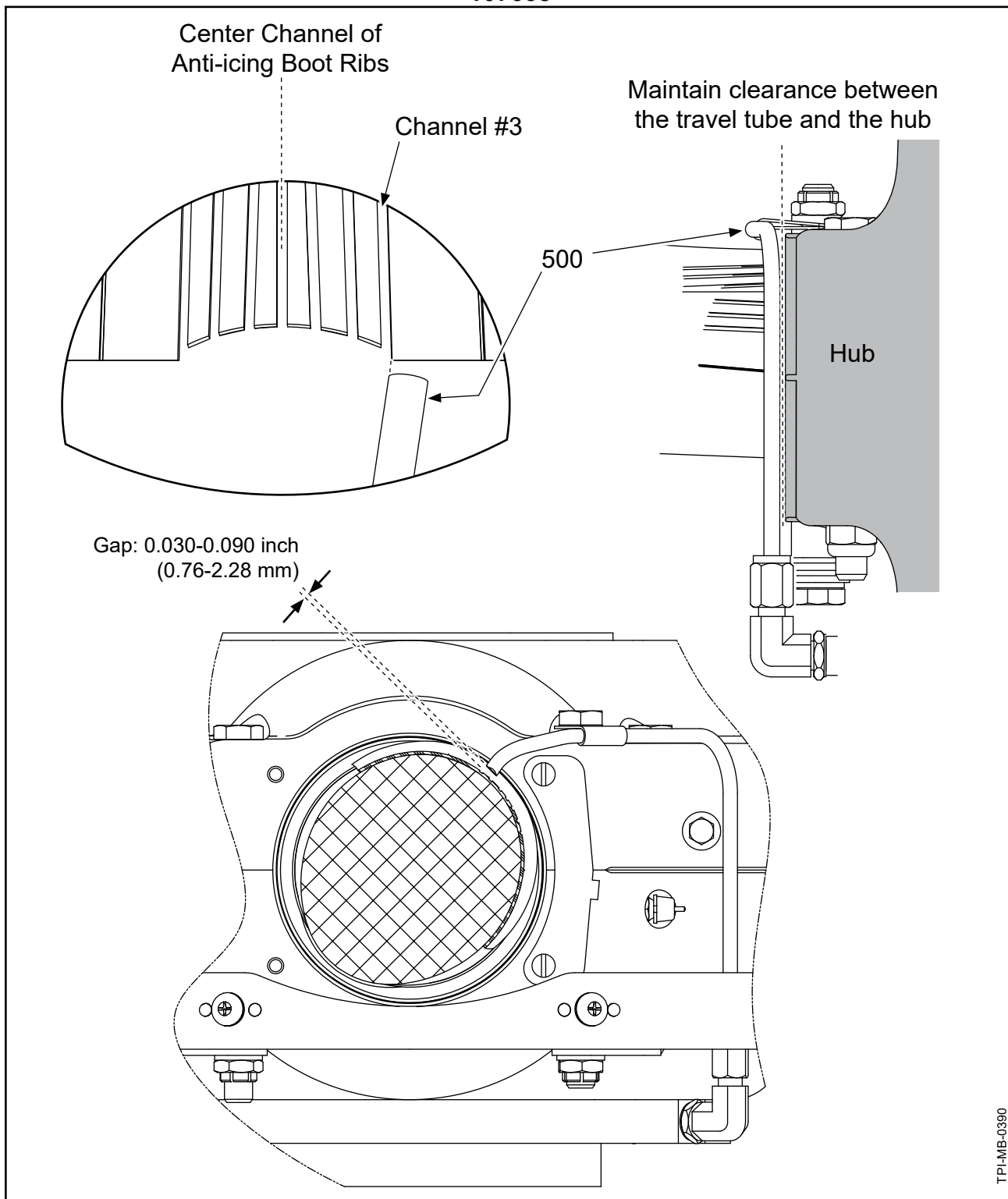
TPI-MB-0389

**Travel Tube Installation  
Figure 10O-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**107638**



**Travel Tube/Anti-ice Boot Alignment  
Figure 10O-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**107638**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>107638</b>	<b>ANTI-ICE KIT INSTALLATION INSTRUCTION 100 FIGURES: 100-1 thru 100-3</b>		
100	B-3867-272	SCREW, 10-32, 100 DEG HEAD, CRES	8	Y
200	B-3860-10L	WASHER, DIMPLED, 100° CRES	8	Y
300	B-3834-0663	WASHER	4	Y
400	107674	SLINGER RING UNIT	1	
405	107636	• SLINGER RING (ITEM 405 IS NOT AVAILABLE. MUST ORDER ITEM 400)	1	
410	N/A	• 90° ELBOW FITTING, 3/16, FERULOK, ZINC-PLATED	4	
415	108505	• • FERRULE, 3/16, FERULOK, ZINC-PLATED	1	
420	108504	• • NUT, 3/16, FERULOK, ZINC-PLATED	1	
500	107637	TRAVEL TUBE REPLACED BY ITEM 500A	4	
500A	108445	TRAVEL TUBE REPLACES ITEM 500	4	
600	107011-54	CLAMP, SINGLE LOOP	4	Y

- ITEM NOT ILLUSTRATED

**Anti-ice Kit: 107638**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**107122 and 107988**

**P.     Installation Instruction 10P**

- (1) The fitting (60) installed on the spinner bulkhead consists of three components:
  - (a) Nut (61)
  - (b) Ferrule (62)
  - (c) Base

**NOTE:**     The base is installed on the slinger ring assembly attached to the bulkhead assembly.

- (2) Install the nut (61) and the ferrule (62) from the bulkhead fitting (60) onto the travel tube (5020) in accordance with Figure 10P-1.
  - (a) Install the ferrule (62) from the bulkhead fitting (60) onto the travel tube (5020) with the cone side towards the slinger ring-end of the travel tube.
  - (b) Apply grease CM12, to the ferrule (62), threads of the base, and the cone inside the nut (61) of the bulkhead fitting.
- (3) Insert the travel tube (5020) into the base of the bulkhead fitting (60) until it is firmly seated.
  - (a) Hand-tighten the nut (61) of the bulkhead fitting (60) onto the base.
- (4) Install the clamp (5265) onto the travel tube (5020) with the flat side of the clamp toward the hub as shown in Figure 10P-1.
- (5) Using the bolt (5000), washers (200 and 400), spacer (300), and the existing washer and nut, attach the clamp (5265) to the hub in accordance with Figure 10P-1.
  - (a) Do not tighten the nut at this time.
- (6) With the propeller blades set at low blade angle, align the opening of the travel tube (5020) with Channel #3 of the anti-icing boot as shown in Figure 10P-2.
  - (a) Adjust the travel tube (5020) to get the correct gap between the opening of the travel tube and the anti-icing boot as shown in Figure 10P-2.

**CAUTION:**     CHECK THE ALIGNMENT OF THE TRAVEL TUBE  
AFTER TORQUING.

- (b) Torque the hub clamping nut 20-22 Ft-Lbs (28-29 N•m).
- (7) Repeat the installation steps for all remaining travel tubes (5020).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**107122 and 107988**

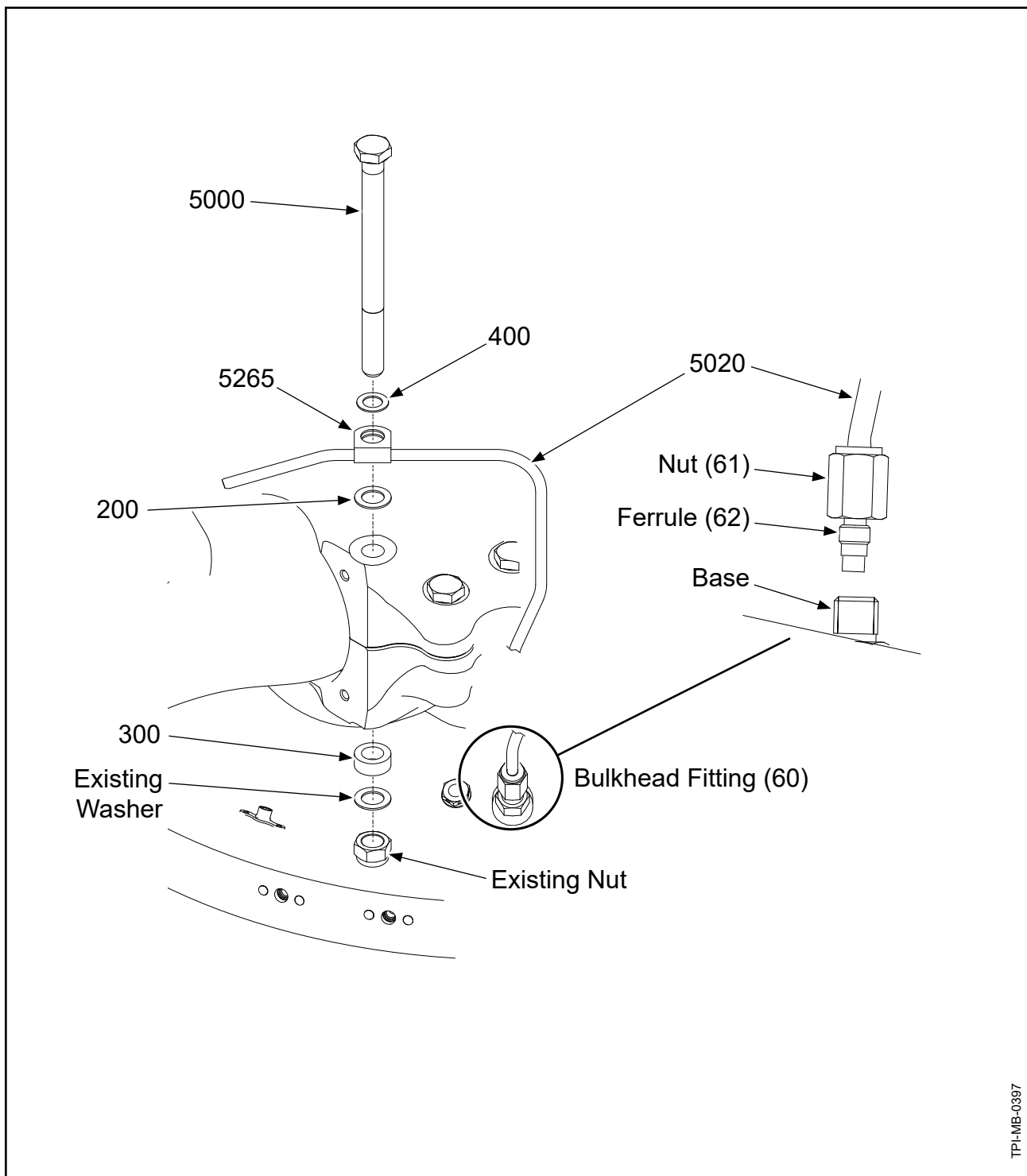
P. Installation Instruction 10P - continued

**CAUTION:** THE TRAVEL TUBE (5020) MUST NOT CONTACT THE SPINNER  
DOME BLADE CUTOUT.

- (8) Put the spinner dome on the bulkhead, aligning the attaching holes.
  - (a) Check for clearance between the travel tubes (5020) and the spinner dome blade cutout. The travel tubes must not contact the spinner dome blade cutout.
    - 1 Adjust the position of the travel tube(s) (5020) as required.
- (9) Remove the spinner dome.
- (10) Make an alignment mark on the nut (61) and base of the bulkhead fitting (60).
- (11) Holding the base of the bulkhead fitting (60) to prevent rotation, use a wrench to tighten the nut (61) an additional 1 and 3/4 turns from the alignment mark.
  - (a) If the nut (61) is removed before final installation, install the nut (61) and hand tighten.
    - 1 Holding the base of the bulkhead fitting (60) to prevent rotation, use a wrench to tighten the nut (61) an additional 1/3 to 1/2 turn.
- (12) After installation of the propeller on the aircraft and installation of the spinner dome, check for clearance between the travel tubes (5020) and the spinner dome blade cutouts.
  - (a) If any of the travel tubes contact the spinner dome blade cutouts, remove the propeller from the aircraft and adjust the travel tube(s) in accordance with the instructions in this section.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

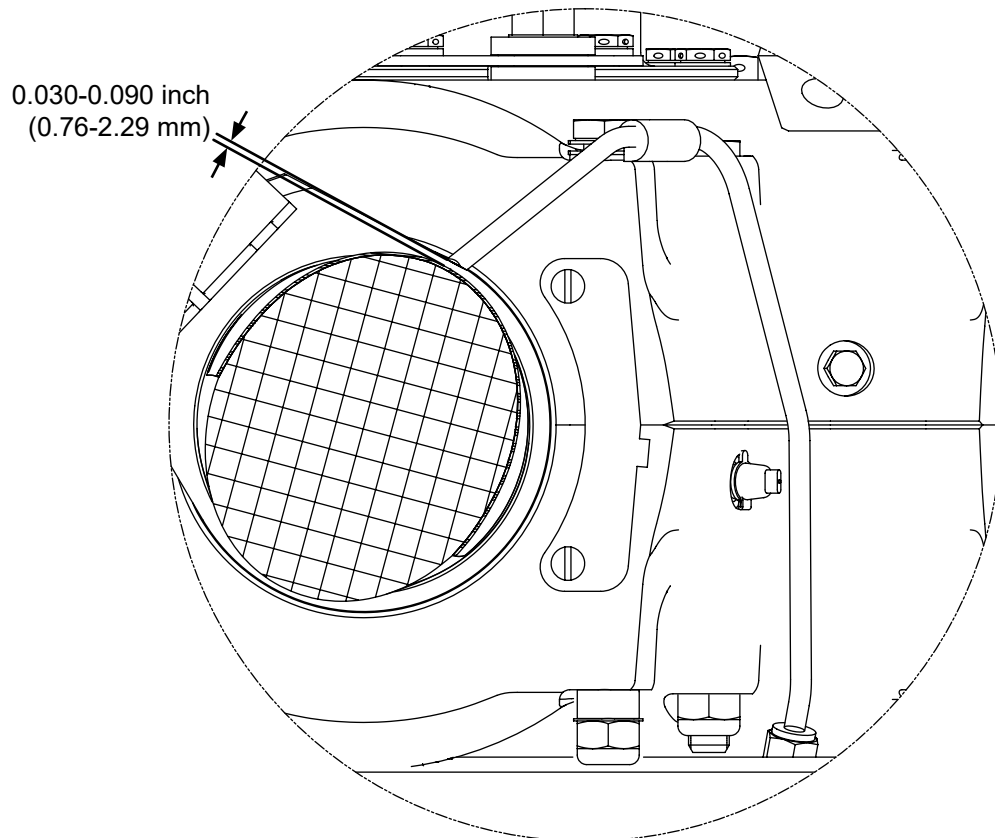
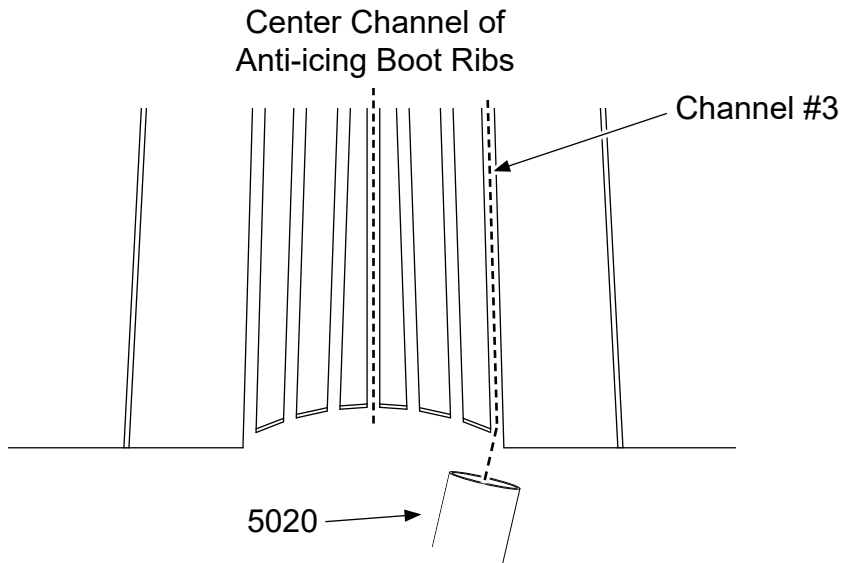
This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**107122 and 107988**



**Travel Tube Installation  
Figure 10P-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**107122 and 107988**



TPI-MB-0268  
TPI-MB-0419

**Travel Tube Alignment  
Figure 10P-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**107122 and 107988**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>107122</b>	<b>ANTI-ICE KIT INSTALLATION INSTRUCTION 10P FIGURES: 10P-1 and 10P-2</b>		
200	B-3834-0663	WASHER	4	Y
300	A-2246-4	SPACER, ALUMINUM	4	
400	B-3834-0632	WASHER	4	Y
5000	102691	BOLT, 3/8-24, HEX HEAD	4	
5020	107121	TRAVEL TUBE	4	
5265	107011-54	CLAMP, SINGLE LOOP	4	Y
		ITEMS 60, 61, AND 62 ARE COMPONENTS OF THE APPLICABLE BULKHEAD UNIT. THESE PARTS ARE LISTED FOR REFERENCE ONLY.		
60	104748	FITTING, 3/16, FERULOK	5	
61	107167	• NUT, 3/16, FERULOK, SS	1	
62	107168	• FERRULE, 3/16, FERULOK, SS	1	

- ITEM NOT ILLUSTRATED

**Anti-ice Kit: 107122**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**107122 and 107988**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>107988</b>	<b>ANTI-ICE KIT INSTALLATION INSTRUCTION 10P FIGURES: 10P-1 and 10P-2</b>		
200	B-3834-0663	WASHER	4	Y
300	A-2246-4	SPACER, ALUMINUM	4	
400	B-3834-0632	WASHER	4	Y
5000	102691	BOLT, 3/8-24, HEX HEAD	4	
5020	107987	TRAVEL TUBE	4	
5265	107011-54	CLAMP, SINGLE LOOP	4	Y
		ITEMS 60, 61, AND 62 ARE COMPONENTS OF THE APPLICABLE BULKHEAD UNIT. THESE PARTS ARE LISTED FOR REFERENCE ONLY.		
60	104748	FITTING, 3/16, FERULOK	5	
61	107167	• NUT, 3/16, FERULOK, SS	1	
62	107168	• FERRULE, 3/16, FERULOK, SS	1	

- ITEM NOT ILLUSTRATED

**Anti-ice Kit: 107988**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**108415**

Q. Installation Instruction 10Q

- (1) Remove the existing hub clamping bolt/hardware from the trailing edge-side of each blade cutout on the hub as shown in Figure 10Q-1.
  - (a) Reinstall the existing hub clamping bolts, washers (100), existing spacer, existing washer, and existing nut in accordance with Figure 10Q-1.
  - (b) Torque the existing nut to 24-26 Ft-Lbs (33-35 N•m).
- (2) Remove the existing hub clamping bolt/hardware from the leading edge-side of each blade cutout on the hub as shown in Figure 10Q-2.
- (3) Slide the loop clamp (200) onto the travel tube (300) as shown in Figure 10Q-2.
- (4) Using the bolt (400), three washers (100), existing spacer, existing washer, and the existing nut, attach the loop clamp (200) to the hub in accordance with Figure 10Q-2.
  - (a) Do not tighten the existing nut.
- (5) Install the slinger ring (500) in accordance with Figure 10Q-3 and the following steps:
  - (a) Install one seal washer (600) onto each fluid transfer fitting (700).
  - (b) Put the three fluid transfer fittings (700) through the holes in the slinger ring (500).
  - (c) Put one seal washer (600), aluminum spacer (800), and one washer (100) onto each fluid transfer fitting (700) as shown in Figure 10Q-3.
  - (d) Put the fluid transfer fittings (700) through the holes in the bulkhead, then install one washer (900) and self-locking nut (1000) onto each fluid transfer fitting.
    - 1 Torque each self-locking nut (1000) to 10-12 Ft-Lbs (13.6-16.2 N•m).
- (6) Apply grease CM12 to the ferrule (1100), the external threads of the fluid transfer fitting (700), and the cone inside of the ferulok nut (1200).
- (7) Insert the ferrule (1100) into the fluid transfer fitting (700) with the cone-side of the ferrule down as shown in Figure 10Q-3.
  - (a) Loosely install the ferulok nut (1200).
- (8) Insert the travel tube (300) through the ferulok nut (1200) and the ferrule (1100) as shown in Figure 10Q-3 until it is firmly seated in the fluid transfer fitting (700).
- (9) Hand-tighten the ferulok nut (1200) to the fluid transfer fitting (700).
  - (a) Make an alignment mark on the ferulok nut (1200) and the fluid transfer fitting (700).

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**108415**

Q. Installation Instruction 10Q, continued

- (10) Holding the fluid transfer fitting (700) to prevent rotation, use a wrench to tighten the ferulok nut (1200) an additional 1 and 3/4 turns from the alignment mark.
  - (a) If the ferulok nut (1200) is removed before final installation, install the ferulok nut and hand tighten.
    - 1 Holding the base of the fluid transfer fitting (700) to prevent rotation, use a wrench to tighten the furulok nut (1200) an additional 1/3 to 1/2 turn.
- (11) With the propeller blades set at low blade angle, align the centerline of the travel tube (300) with the right edge of rib #3 on the anti-icing boot as shown in Figure 10Q-4.
  - (a) Adjust the travel tube (300) to get the correct gap between the opening of the travel tube and the anti-icing boot as shown in Figure 10Q-4.
- (12) Put the spinner dome on the bulkhead, aligning the mounting holes.

**CAUTION: THE TRAVEL TUBE (300) MUST NOT CONTACT THE  
SPINNER DOME BLADE CUTOUT.**

- (a) Check for clearance between the travel tubes (300) and the spinner dome blade cutout.
  - 1 There must be at least 0.080 in (2.03 mm) clearance between the travel tubes and the spinner dome blade cutout.
  - 2 Adjust the position of the travel tube(s) (300) to get the required clearance.
- (b) Remove the spinner dome.

**CAUTION 1: CHECK ALIGNMENT OF THE TRAVEL TUBE (300) AFTER  
TORQUING.**

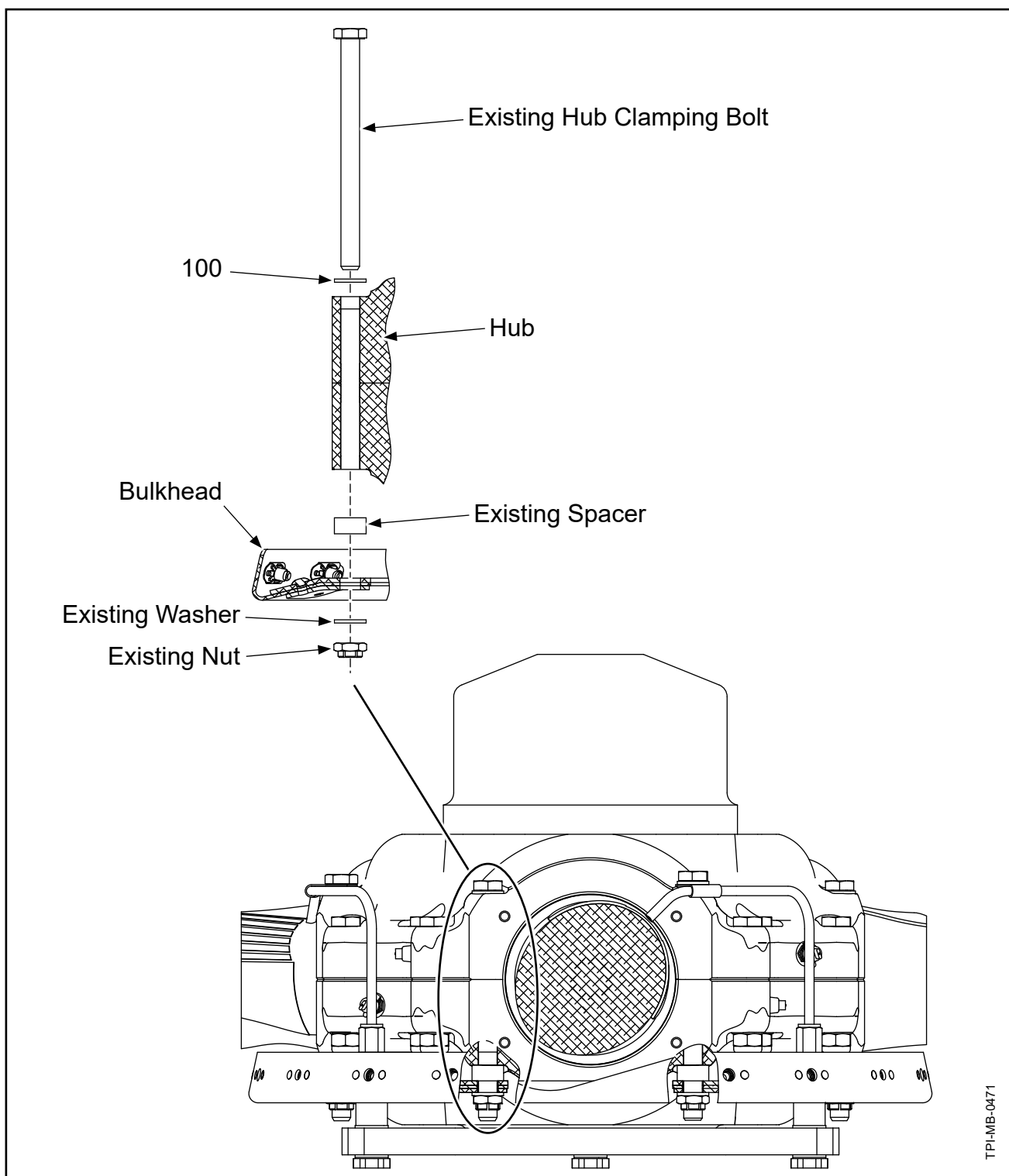
- (13) Torque the existing nut on bolt (400) to 24-26 Ft-Lbs (33-35 N•m).  
Refer to Figure 10Q-2.
- (14) Repeat the installation steps for all remaining travel tubes (300).
- (15) After installation of the propeller on the aircraft and installation of the spinner dome, check for clearance between the travel tubes (300) and the spinner dome blade cutouts.
  - (a) If the clearance is less than 0.080 in. (2.03 mm), remove the spinner dome and adjust the travel tube(s) in accordance with the instructions in this section.



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

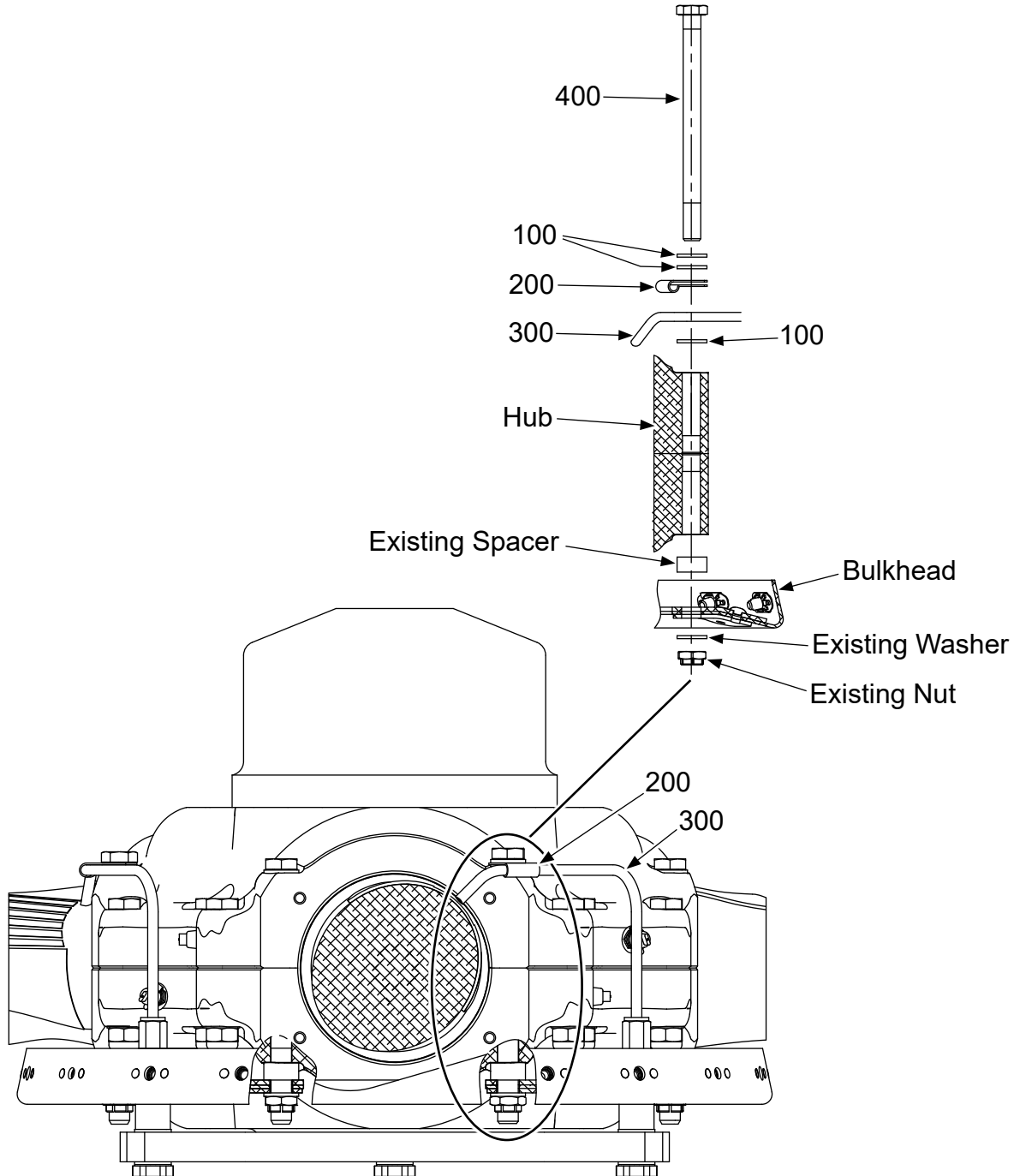
**108415**



**Hub Clamping Hardware  
Figure 10Q-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**108415**



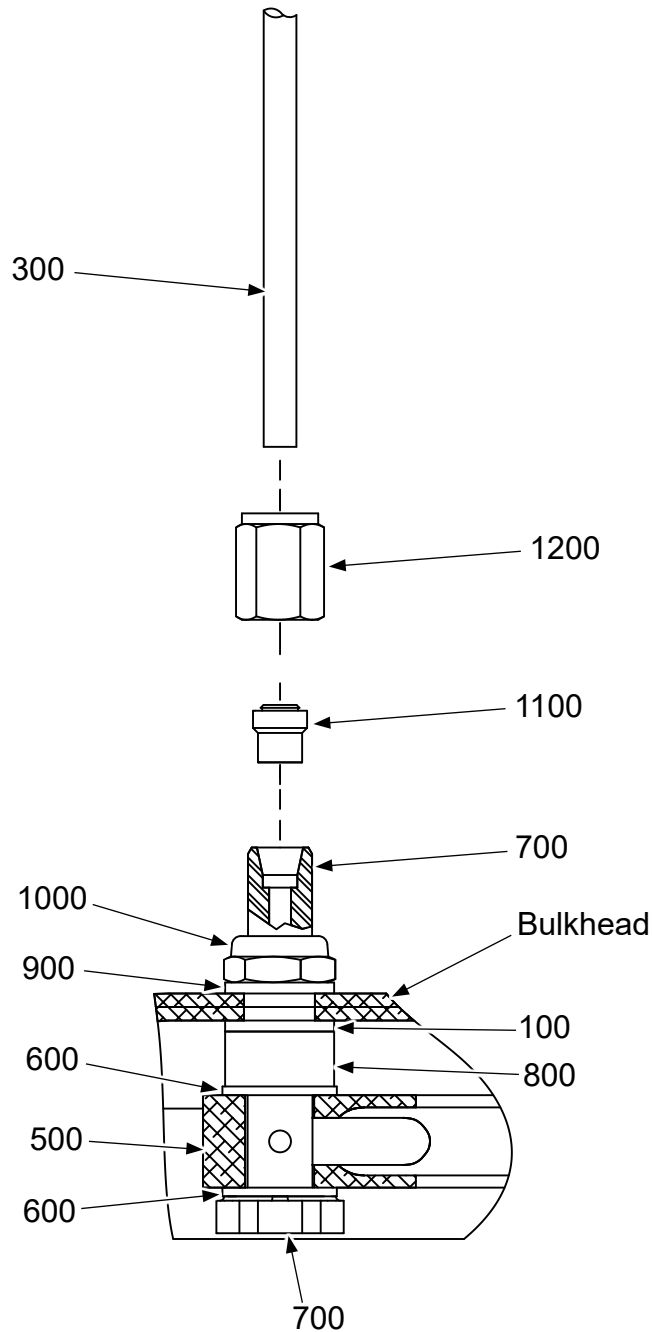
TPI-MB-0473

**Travel Tube/Loop Clamp Hardware  
Figure 10Q-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**108415**



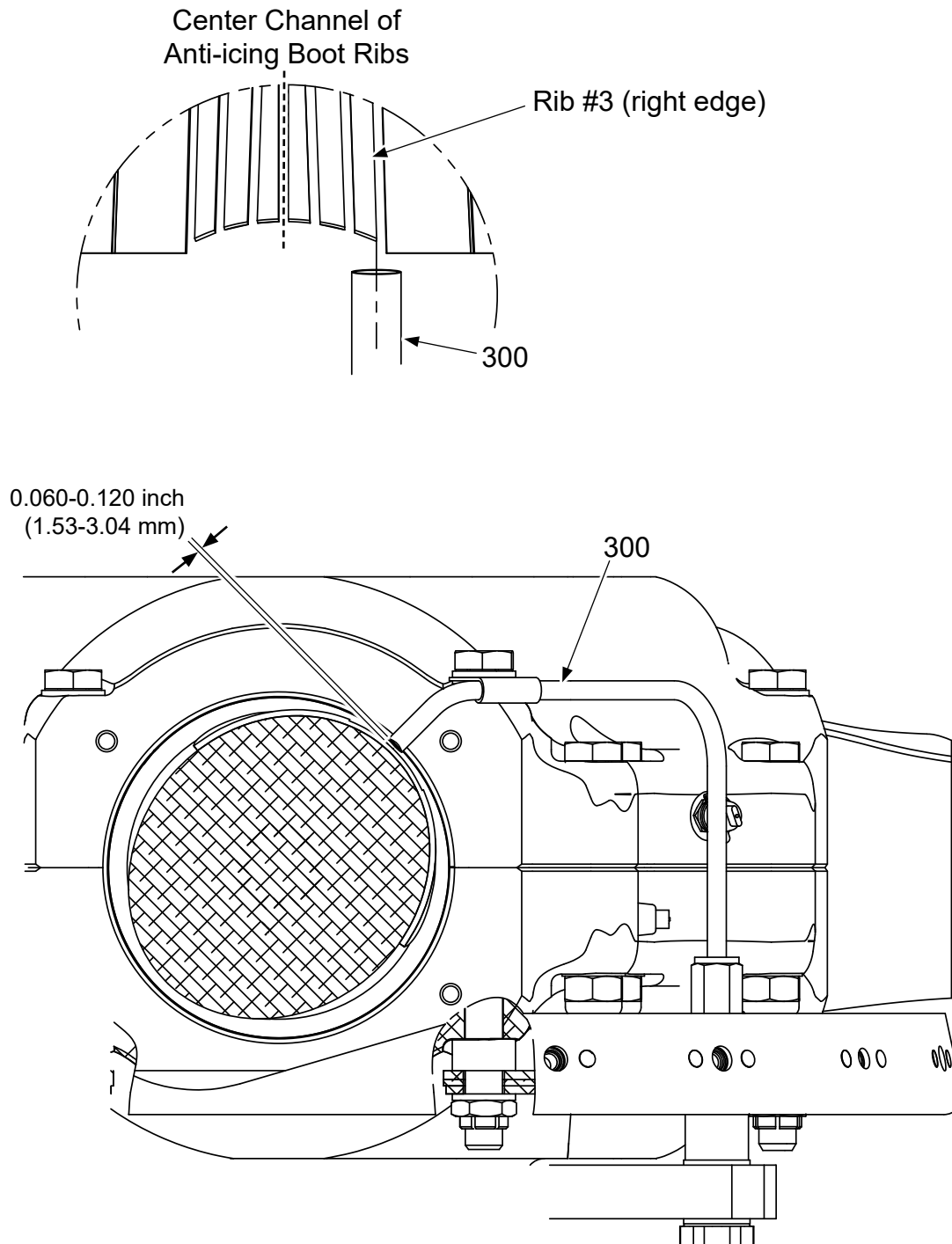
**Travel Tube/Fluid Transfer Fitting  
Figure 10Q-3**

TP-LMB-0472

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**108415**



TPL-MB-0474

**Travel Tube Alignment  
Figure 10Q-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**108415**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>108415</b>	<b>ANTI-ICE KIT INSTALLATION INSTRUCTION 10Q FIGURES: 10Q-1 and 10Q-4</b>		
100	B-3834-0663	WASHER	15	Y
200	107011-54	CLAMP, SINGLE LOOP	3	Y
300	108462	TRAVEL TUBE	3	
400	A-3203	BOLT, 3/8-24, HEX HEAD	3	
500	108461	SLINGER RING	1	
600	107156	SEAL, WASHER	6	
700	107212-1	FITTING, FLUID TRANSFER	3	
800	A-2246-1	SPACER, ALUMINUM	3	
900	B-3834-0632	WASHER	3	Y
1000	B-3359	NUT, 3/8-24, HEX, SELF-LOCKING	3	Y
1100	107168	FERRULE, 3/16, FERULOK	3	
1200	107167	NUT, 3/16, FERULOK	3	

- ITEM NOT ILLUSTRATED

**Anti-ice Kit: 108415**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**108415**

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This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**108279**

R. Installation Instruction 10R

**WARNING:** ALIGNMENT OF THE TRAVEL TUBE WELDMENT (100) TO THE ANTI-ICING BOOT CAN ONLY BE PERFORMED ON A PROPELLER BUILD BENCH CAPABLE OF SETTING BLADE ANGLE.

- (1) The fitting (60) installed on the spinner bulkhead consists of three components:
  - (a) Nut (61)
  - (b) Ferrule (62)
  - (c) Base

**NOTE:** The base is installed on the slinger ring assembly attached to the bulkhead assembly.

- (2) Install the nut (61) from the bulkhead fitting (60) onto the travel tube (100), then install the ferrule (62) from the bulkhead fitting (60) onto the travel tube (100) with the cone side of the ferrule towards the slinger ring-end of the travel tube as shown in Figure 10R-1.
- (3) Apply grease CM12, to the ferrule (62), threads of the base, and the cone inside the nut (61) of the bulkhead fitting (60).
- (4) Insert the travel tube (100) into the base of the bulkhead fitting (60) until it is firmly seated.
  - (a) Hand tighten the nut (61) to the base of the bulkhead fitting (60).
- (5) Remove the existing hub clamping bolt/hardware from the leading edge-side of each blade cutout on the hub. Refer to Figure 10R-1.
- (6) Install the clamp (200) onto the travel tube (100).
- (7) Using the bolt (300), washers (400 and 500), spacer (600), and the existing hub clamping washer and nut, attach the clamp (200) to the hub in accordance with Figure 10R-1.
  - (a) Do not tighten the hub clamping nut at this time.
- (8) With the propeller blade angle at 21 degrees, align the opening of the travel tube (100) with the center channel of the anti-icing boot. Refer to Figure 10R-2.
  - (a) Adjust the travel tube (100) to get the correct gap between the opening of the travel tube and the anti-icing boot as shown in Figure 10R-2.

**CAUTION:** THE TRAVEL TUBE (100) MAY ROTATE DURING THE TORQUE PROCESS, CHECK ALIGNMENT OF THE TRAVEL TUBE UNIT AFTER TORQUING.

- (b) Torque the hub clamping nut 20-22 In-Lbs (2.3-2.4 N•m).

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**108279**

R. Installation Instruction 10R - continued

(9) Repeat the installation steps for all remaining travel tubes (100).

**CAUTION:** THE TRAVEL TUBE (100) MUST NOT CONTACT THE SPINNER  
DOME BLADE CUTOUT.

(10) Put the spinner dome on the bulkhead, aligning the attaching holes.

(a) Check for clearance between the travel tubes (100) and the spinner dome  
blade cutout. The travel tubes must not contact the spinner dome blade  
cutout.

1 Adjust the position of the travel tube(s) (100) as required.

(11) Remove the spinner dome.

(12) Make an alignment mark on the nut (61) and base of the bulkhead fitting (60).

(13) Holding the base of the bulkhead fitting (60) to prevent rotation, use a wrench  
to tighten the nut (61) an additional 1 and 3/4 turns from the alignment mark.

(a) If the nut (61) is removed before final installation, install the nut (61) and  
hand tighten.

1 Holding the base of the bulkhead fitting (60) to prevent rotation,  
use a wrench to tighten the nut (61) an additional 1/3 to 1/2 turn.

(14) After installation of the propeller on the aircraft and installation of the spinner  
dome, check for clearance between the travel tubes (100) and the spinner  
dome blade cutouts.

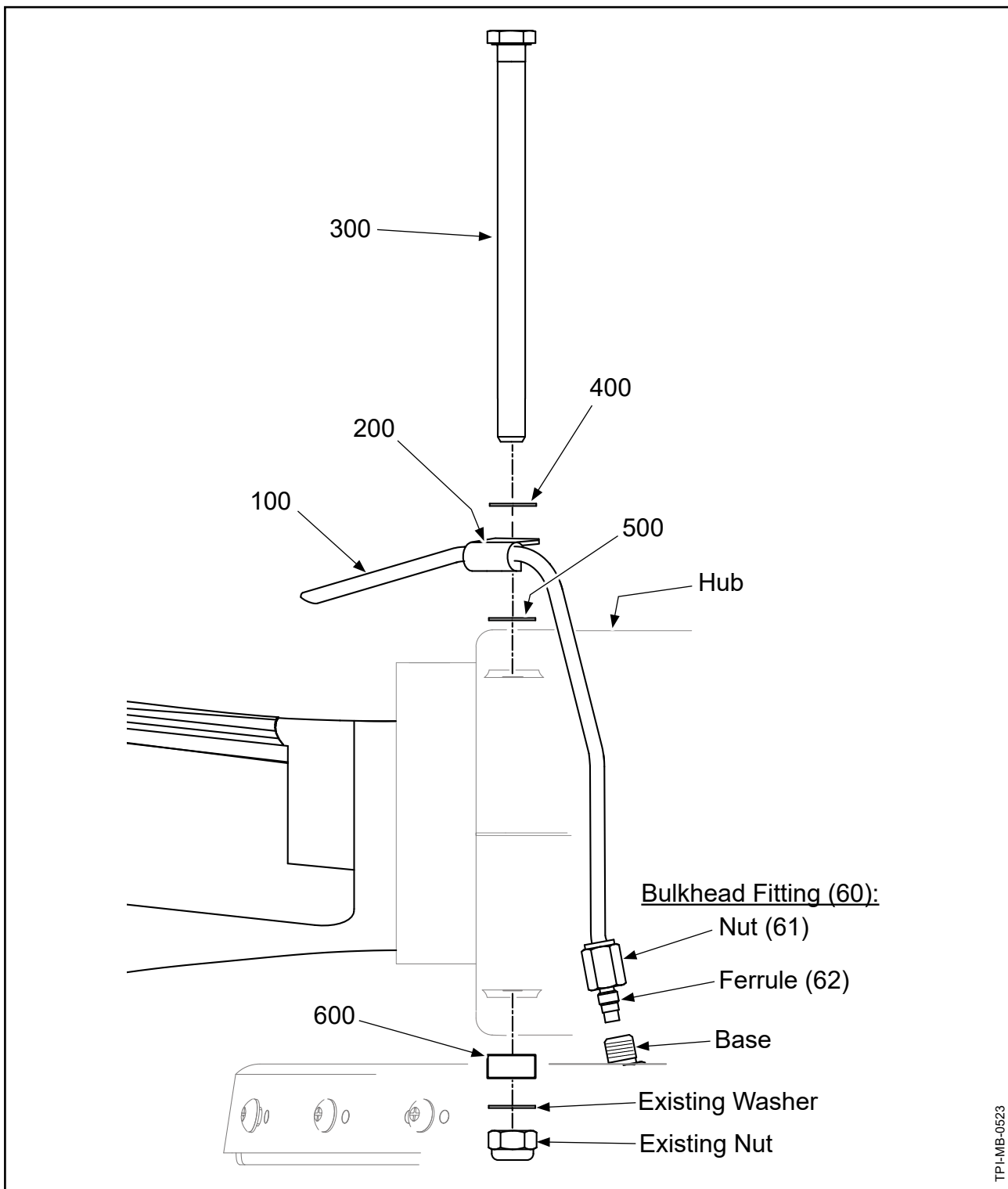
(a) If any of the travel tubes contact the spinner dome blade cutouts, remove  
the propeller from the aircraft and adjust the travel tube(s) in accordance  
with the instructions in this section.



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**108279**

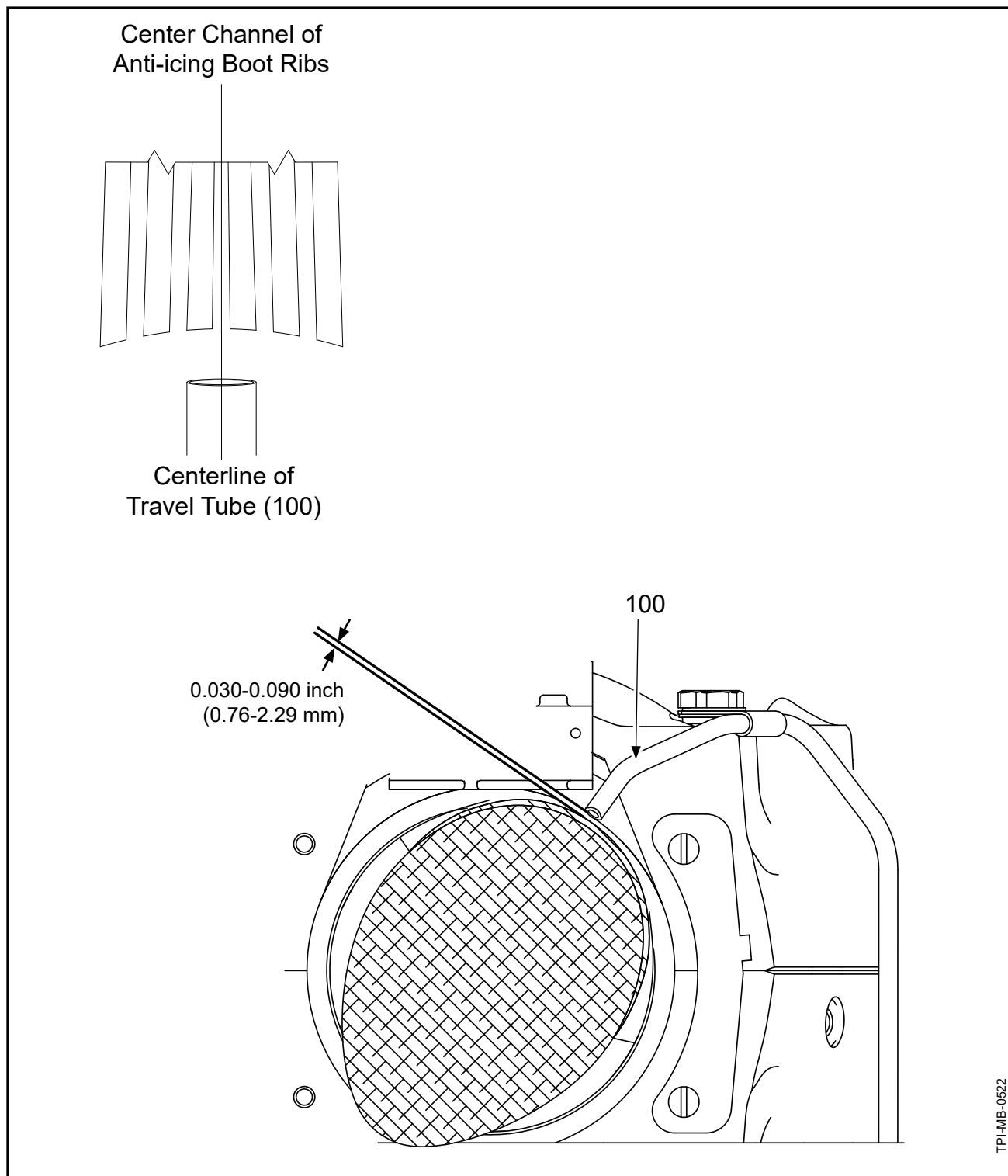


TP1-MB-0523

**Travel Tube Installation  
Figure 10R-1**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**108279**



**Positioning the Travel Tube  
Figure 10R-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**108279**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>108279</b>	<b>ANTI-ICE KIT INSTALLATION INSTRUCTIONS 10R FIGURES: 10R-1 and 10R-2</b>		
100	108278	• TRAVEL TUBE	5	
200	107011-54	• CLAMP, SINGLE LOOP	5	Y
300	107083	• BOLT, 3/8-24, HEX HEAD	5	
400	B-3834-0632	• WASHER	5	Y
500	B-3834-0663	• WASHER	5	Y
600	A-2246-4	• SPACER, ALUMINUM	5	
		ITEMS 60, 61, AND 62 ARE COMPONENTS OF THE APPLICABLE BULKHEAD UNIT. THESE PARTS ARE LISTED FOR REFERENCE ONLY.		
60	104748	FITTING, 3/16, FERULOK	5	
61	107167	• NUT, 3/16, FERULOK, SS	1	
62	107168	• FERRULE, 3/16, FERULOK, SS	1	

- ITEM NOT ILLUSTRATED

**Anti-ice Kit: 108279**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**108279**

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This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**109056**

S. Installation Instruction 10S

**WARNING:** ALIGNMENT OF THE TRAVEL TUBE WELDMENT (100) TO THE ANTI-ICING BOOT CAN ONLY BE PERFORMED ON A PROPELLER BUILD BENCH CAPABLE OF SETTING BLADE ANGLE.

- (1) The fitting (60) installed on the spinner bulkhead consists of three components:
  - (a) Nut (61)
  - (b) Ferrule (62)
  - (c) Base

**NOTE:** The base is installed on the slinger ring assembly attached to the bulkhead assembly.

- (2) Install the nut (61) and the ferrule (62) from the bulkhead fitting (60) onto the travel tube (100) in accordance with Figure 10S-1.
  - (a) Install the ferrule (62) from the bulkhead fitting (60) onto the travel tube (100) with the cone side towards the slinger ring-end of the travel tube.
  - (b) Apply grease CM12, to the ferrule (62), threads of the base, and the cone inside the nut (61) of the bulkhead fitting.
- (3) Insert the travel tube (100) into the base of the bulkhead fitting (60) until it is firmly seated.
  - (a) Hand-tighten the nut (61) of the bulkhead fitting (60) onto the base.
- (4) Install the clamp (200) onto the travel tube (100) with the clamp positioned as shown in Figure 10S-1.
- (5) Using the bolt (300), washers (400 and 500), spacer (600), and the existing washer and nut, attach the clamp (200) to the hub on the leading edge-side of the blade cut out in accordance with Figure 10S-1.
  - (a) Do not tighten the nut at this time.

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**109056**

S. Installation Instruction 10S - continued

- (6) With the propeller blades set at 30 degrees, align the opening of the travel tube (100) with the center channel of the anti-icing boot as shown in Figure 10S-2.
  - (a) Adjust the travel tube (100) to get the correct gap between the opening of the travel tube and the anti-icing boot as shown in Figure 10S-2.

**CAUTION: CHECK THE ALIGNMENT OF THE TRAVEL TUBE  
AFTER TORQUING.**

- (b) Torque the hub clamping nut 20-24 Ft-Lbs (28-29 N•m).
- (7) Repeat the installation steps for all remaining travel tubes (100).

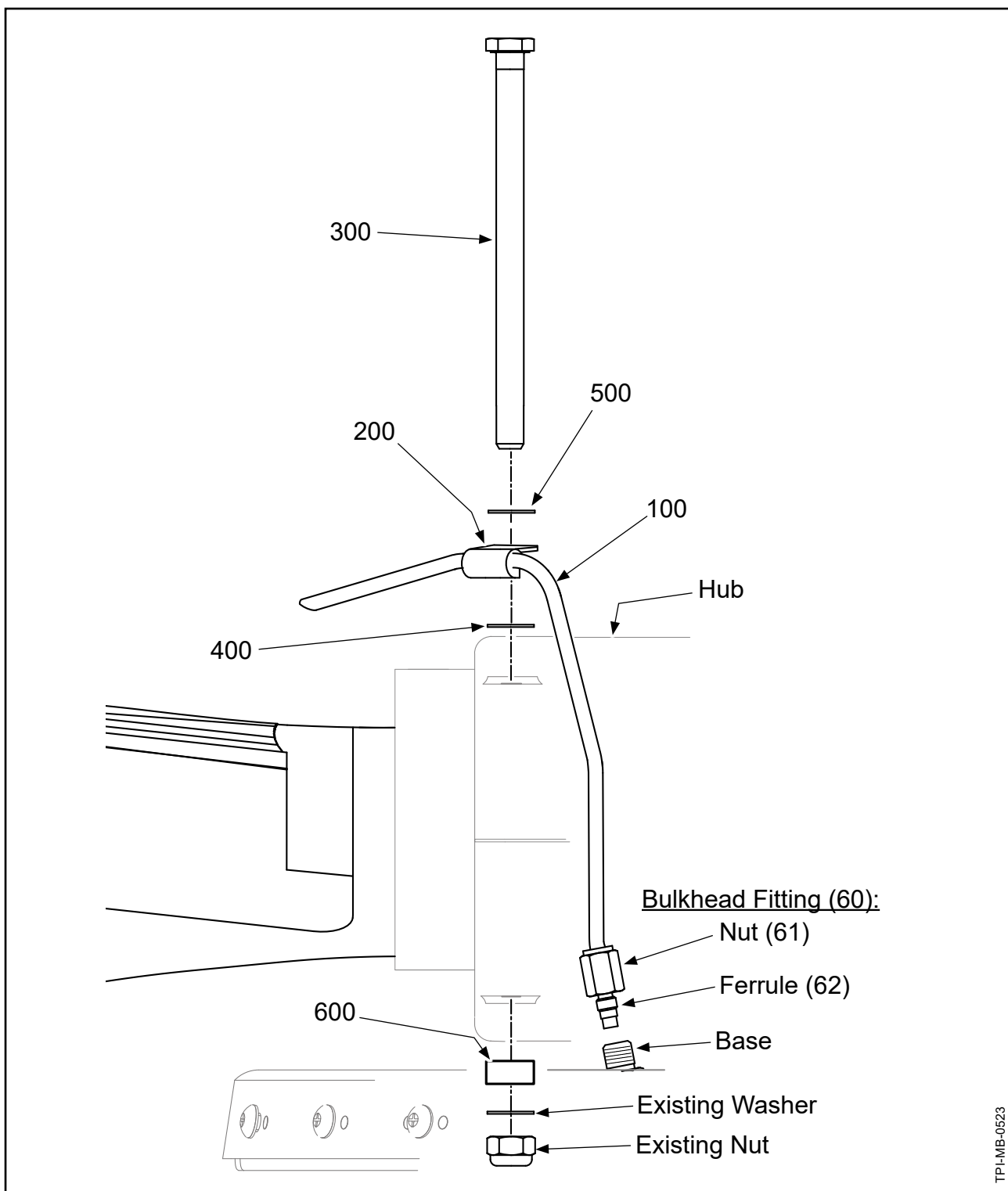
**CAUTION: THE TRAVEL TUBE (100) MUST NOT CONTACT THE SPINNER  
DOME BLADE CUTOUT.**

- (8) Put the spinner dome on the bulkhead, aligning the attaching holes.
  - (a) Check for clearance between the travel tubes (100) and the spinner dome blade cutout. The travel tubes must not contact the spinner dome blade cutout.
    - 1 Adjust the position of the travel tube(s) (100) as required.
- (9) Remove the spinner dome.
- (10) Make an alignment mark on the nut (61) and base of the bulkhead fitting (60).
- (11) Holding the base of the bulkhead fitting (60) to prevent rotation, use a wrench to tighten the nut (61) an additional 1 and 3/4 turns from the alignment mark.
  - (a) If the nut (61) is removed before final installation, install the nut (61) and hand tighten.
    - 1 Holding the base of the bulkhead fitting (60) to prevent rotation, use a wrench to tighten the nut (61) an additional 1/3 to 1/2 turn.
- (12) After installation of the propeller on the aircraft and installation of the spinner dome, check for clearance between the travel tubes (100) and the spinner dome blade cutouts.
  - (a) If any of the travel tubes contact the spinner dome blade cutouts, remove the propeller from the aircraft and adjust the travel tube(s) in accordance with the instructions in this section.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**109056**

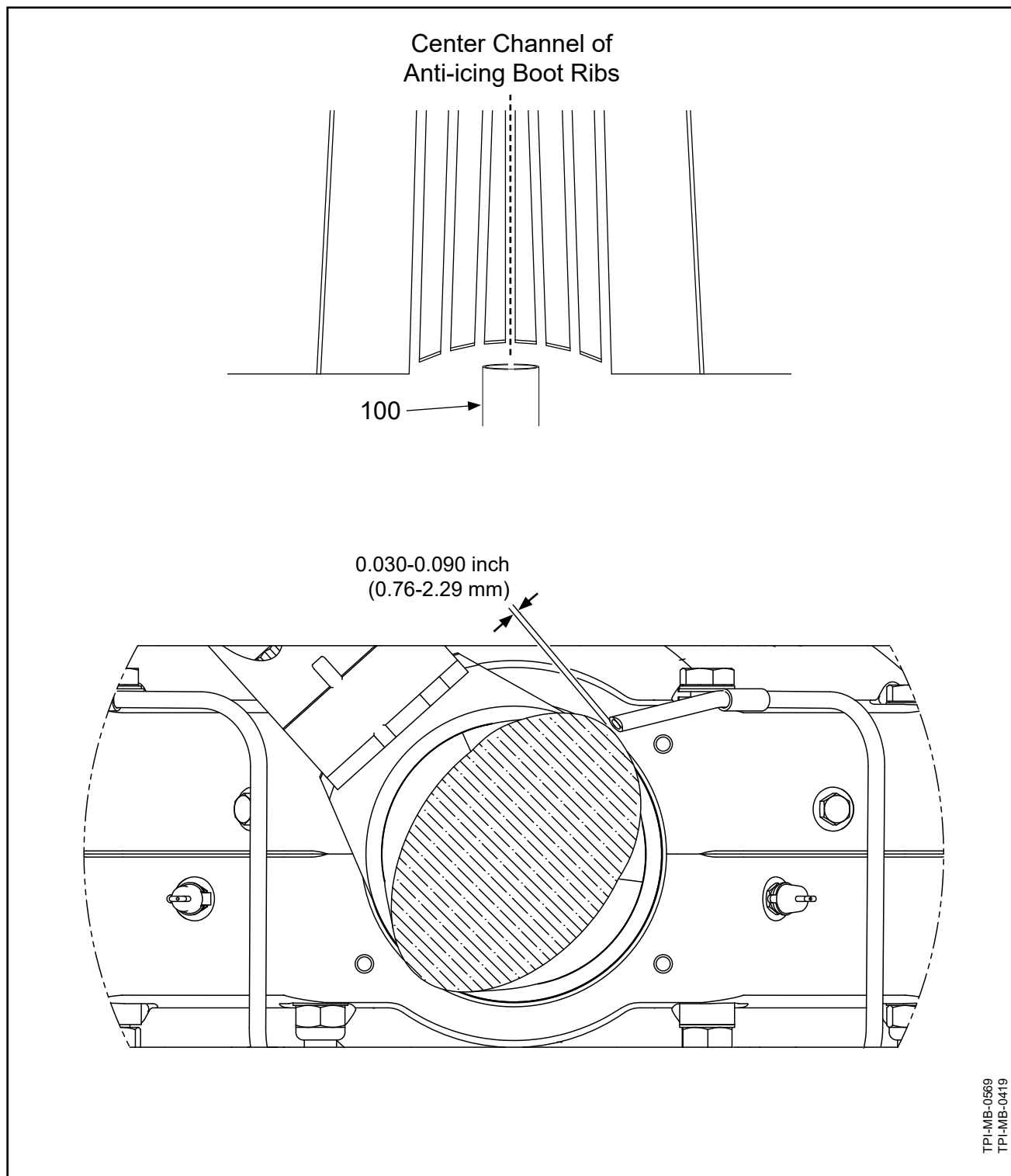


**Travel Tube Installation  
Figure 10S-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**109056**



**Travel Tube Alignment  
Figure 10S-2**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**109056**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>109056</b>	<b>ANTI-ICE KIT INSTALLATION INSTRUCTION 10T FIGURES: 10S-1 and 10S-2</b>		
100	109063	TRAVEL TUBE	5	
200	107011-54	CLAMP, SINGLE LOOP	5	Y
300	102691	BOLT, 3/8-24, HEX HEAD	5	
400	B-3834-0663	WASHER	5	Y
500	B-3834-0632	WASHER	5	Y
600	A-2246-4	SPACER, ALUMINUM	5	
		ITEMS 60, 61, AND 62 ARE COMPONENTS OF THE APPLICABLE BULKHEAD UNIT. THESE PARTS ARE LISTED FOR REFERENCE ONLY.		
60	104748	FITTING, 3/16, FERULOK	5	
61	107167	• NUT, 3/16, FERULOK, SS	1	
62	107168	• FERRULE, 3/16, FERULOK, SS	1	

- ITEM NOT ILLUSTRATED

**Anti-ice Kit: 109056**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**109056**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):

**A-2167, A-2537, A-2587, and A-2588**

**ATTENTION:** The A-2167 anti-ice kit is also a sub-component of the following spinner bulkhead assembly: D-1871-7R(P) and D-1871-R(P).

The A-2537 anti-ice kit is also a sub-component of the following spinner bulkhead assembly: C-2534-3.

The A-2587 anti-ice kit is also a sub-component of the following spinner bulkhead assembly: D-1871-4R(P) and D-1871-2R(P).

The A-2588 anti-ice kit is also a sub-component of the following spinner bulkhead assemblies: D-1976-2R(P) and D-1976-6R(P).

**T. Installation Instruction 10T**

- (1) Install the anti-ice kit components in accordance with the applicable aircraft TC or STC holder's ICA.

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>A-2167</b>	<b>ANTI-ICE KIT INSTALLATION INSTRUCTION 10T</b>		
	A-1866	HOSE, TRAVEL TUBE	3	
	B-2149	TRAVEL TUBE UNIT	3	
	B-3808-3	NUT, HEX, SELF-LOCKING	6	Y
	B-3845-9	SCREW, 10-32, TRUSS HEAD	6	Y
	B-3851-0332	WASHER	6	Y
	B-3870-632	NUT, HEX, SELF-LOCKING	6	Y
	B-3871-S28	SCREW, 6-32, 100° HEAD	6	
	C-2128	SLINGER RING UNIT	1	
	<b>A-2537</b>	<b>ANTI-ICE KIT INSTALLATION INSTRUCTION 10T</b>		
	B-1909	TRAVEL TUBE UNIT	3	
	B-3871-S27	SCREW, 6-32, 100° HEAD	6	
	B-3870-632	NUT, HEX, SELF-LOCKING	6	Y
	A-1866	HOSE, TRAVEL TUBE	3	
	C-2128-1	SLINGER RING UNIT	1	
	B-3845-9	SCREW, 10-32, TRUSS HEAD	6	Y
	B-3882-1032	NUT, HEX, THIN, SELF-LOCKING	6	Y

- ITEM NOT ILLUSTRATED

**Anti-ice Kits: A-2167 and A-2537**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following anti-ice kit(s):  
**A-2167, A-2537, A-2587, and A-2588**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>A-2587</b>	<b>ANTI-ICE KIT INSTALLATION INSTRUCTION 10T</b>		
	A-1866	HOSE, TRAVEL TUBE	3	
	B-1887	TRAVEL TUBE UNIT	3	
	B-3808-3	NUT, HEX, SELF-LOCKING	6	Y
	B-3845-9	SCREW, 10-32, TRUSS HEAD	6	Y
	B-3851-0332	WASHER	6	Y
	B-3870-632	NUT, HEX, SELF-LOCKING	6	Y
	C-1886	SLINGER RING UNIT	1	
	B-3871-S28	SCREW, 6-32, 100° HEAD	6	
	<b>A-2588</b>	<b>ANTI-ICE KIT INSTALLATION INSTRUCTION 10T</b>		
	A-1866	HOSE, TRAVEL TUBE	3	
	B-2149-1	TRAVEL TUBE UNIT	3	
	B-3808-3	NUT, HEX, SELF-LOCKING	6	Y
	B-3845-9	SCREW, 10-32, TRUSS HEAD	6	Y
	B-3851-0332	WASHER	6	Y
	B-3870-632	NUT, HEX, SELF-LOCKING	6	Y
	C-1886	SLINGER RING UNIT	1	
	7931-24693-S28	MS24693-S28 FLAT HEAD SCREW	6	

- ITEM NOT ILLUSTRATED

**Anti-ice Kits: A-2587 and A-2588**

## APPENDIX

### 1. Anti-ice Overhaul Kits

(Refer to "Table: Appendix-1" for a list of available Anti-ice Overhaul Kits)

#### A. General

- (1) The anti-ice overhaul kit will be identified by the anti-ice kit part number and "-OH". Similar to propeller overhaul kits.
- (2) Refer to Hartzell Propeller Application Guide 159 (61-02-59) for the aircraft application for installation of each anti-ice kit.
- (3) Contact the Hartzell Propeller Product Support Department with any questions regarding mandatory replacement parts or anti-ice overhaul kits.

Telephone: (937) 778-4379 8am - 5pm US Eastern Time

Fax: (937) 778-4215

E-mail: techsupport@hartzellprop.com

#### B. Contents of the Kit

- (1) Anti-ice boots are included in the anti-ice overhaul kits.
  - (a) Different applications may use the same anti-ice kit but different anti-ice boots.
- (2) When anti-ice overhaul kits contain application-specific boots or installation hardware, the anti-ice overhaul kit part number will include an "\*" at the end, and the kit description will specify the variation from the standard kit.

Example:

xxxxxx-OH            Anti-ice O/H Kit

xxxxxx-OH\*1        Anti-ice O/H Kit, C-2131-1 Boot, with Start Locks

xxxxxx-OH\*2        Anti-ice O/H Kit, C-2131-1 Boot, without Start Locks

- (3) Refer to the applicable parts list in this chapter for a complete list of parts that must be replaced at overhaul.

**NOTE:** The anti-ice overhaul kits do not contain parts that are listed as alternates.

Anti-ice Overhaul Kit Part Number	Description
105014-OH	Anti-ice O/H Kit (One Prop)

**Anti-ice Overhaul Kits**  
**Table: Appendix-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

**DE-ICE KIT INSTALLATION and PARTS - CONTENTS**

**NOTE:** Each section includes the installation instructions and parts list(s) for the applicable electric de-ice kit(s).

<u>De-ice Kit Part Number:</u>	<u>Section/Page</u>
BN4PW3060-1 .....	Superseded by 106298 (post HC-SB-30-366)
5E2702-1ALT .....	11EM-1
5E2729-1ALT .....	11EM-1
65-025-1M.....	11EO-1
65-410-1P(*).....	11EN-1
67-870-1ALT .....	11EM-1
67-932-1ALT .....	11EM-1
77-955-1M.....	11EP-1
7931-5E2627-1 .....	11A-1
7931-5E2647-1 .....	11DD-1
7931-5E2681-1 .....	Superseded by 106308 (post HC-SB-30-366)
7931-5E2682-1 .....	11A-1
7931-5E2690-1 .....	11B-1
7931-5E2691-1 .....	11C-1
7931-5E2702-1 .....	11DE-1
7931-5E2705-1 .....	11D-1
7931-5E2707-1 .....	11D-1
7931-5E2710-1 .....	Superseded by 103769
7931-5E2715-1 .....	11E-1
7931-5E2729-1 .....	11DE-1
7931-5E2748-1 .....	11F-1
7931-5E2767-1 .....	11DF-1
7931-5E2782-1 .....	11G-1
7931-5E2792-1 .....	11G-1
7931-5E2793-1 .....	11H-1
7931-5E2796-1 .....	11I-1
7931-5E2797-1 .....	11DG-1
7931-5E2803-1 .....	11J-1
7931-5E5706-1 .....	11K-1

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

DE-ICE KIT INSTALLATION and PARTS - CONTENTS, continued

**NOTE:** Each section includes the installation instructions and parts list(s) for the applicable electric de-ice kit(s).

<u>De-ice Kit Part Number:</u>	<u>Section/Page</u>
7931-65-025-1.....	11L-1
7931-65-035-1.....	11M-1
7931-65-040-1.....	11N-1
7931-65-085-A .....	11O-1
7931-65-085-A*1 .....	11O-1
7931-65-090-1.....	11P-1
7931-65-090-1* .....	11P-1
7931-65-093.....	11Q-1
7931-65-100-1A .....	11R-1
7931-65-100-1B1 .....	11R-1
7931-65-100-1B2 .....	11R-1
7931-65-100-1BM .....	11R-1
7931-65-100-1BS.....	11R-1
7931-65-105-1.....	11S-1
7931-65-125-1A .....	11T-1
7931-65-125-1B .....	11T-1
7931-65-155-1.....	11U-1
7931-65-165-1.....	11V-1
7931-65-210-1A .....	11W-1
7931-65-225.....	11X-1
7931-65-225*1 .....	11X-1
7931-65-225-3.....	11X-1
7931-65-225-3*1 .....	11X-1
7931-65-280-1.....	11Y-1
7931-65-410-1.....	11Z-1
7931-65-420-1.....	11AA-1
7931-65-445-1.....	11AB-1
7931-65-470-1.....	11AC-1



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

DE-ICE KIT INSTALLATION and PARTS - CONTENTS, continued

**NOTE:** Each section includes the installation instructions and parts list(s) for the applicable electric de-ice kit(s).

<u>De-ice Kit Part Number:</u>	<u>Section/Page</u>
7931-65-470-3.....	11AC-1
7931-65-530-1.....	11AD-1
7931-65-550-1.....	11AE-1
7931-65-550-3.....	11AE-1
7931-65-550-5.....	11AE-1
7931-65-595-1.....	11AF-1
7931-65-600-1.....	11AG-1
7931-65-600-4.....	11AH-1
7931-65-616-1.....	11AI-1
7931-65-616-1B .....	11AI-1
7931-67-050-1.....	11AJ-1
7931-67-060-2.....	11AK-1
7931-67-060-4.....	11AK-1
7931-67-060-4AL .....	11AK-1
7931-67-110-1 .....	11AL-1
7931-67-125-3.....	11AM-1
7931-67-195-1.....	Obsolete - replaced by 102600-( ) kits
7931-67-240-1.....	11AN-1
7931-67-245-1.....	11AO-1
7931-67-250-2.....	11AP-1
7931-67-265-1.....	11AQ-1
7931-67-265-2.....	11AQ-1
7931-67-280-2.....	11AR-1
7931-67-315-1.....	11AS-1
7931-67-340-5.....	11AT-1
7931-67-370-1.....	11AU-1
7931-67-440-1.....	11AV-1
7931-67-450-1.....	11DG-1

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

DE-ICE KIT INSTALLATION and PARTS - CONTENTS, continued

**NOTE:** Each section includes the installation instructions and parts list(s) for the applicable electric de-ice kit(s).

<u>De-ice Kit Part Number:</u>	<u>Section/Page</u>
7931-67-480-1.....	11DL-1
7931-67-480-3.....	11DI-1
7931-67-500-3.....	11DJ-1
7931-67-510-3.....	11AW-1
7931-67-530-1.....	11DK-1
7931-67-535-1.....	11DK-1
7931-67-570-1.....	11AX-1
7931-67-585-1.....	11AY-1
7931-67-595-1.....	11AZ-1
7931-67-600-1.....	11DL-1
7931-67-610-1.....	11BA-1
7931-67-625-1.....	11BB-1
7931-67-645-1.....	Superseded by 106299 (post HC-SB-30-366)
7931-67-680-5.....	11BC-1
7931-67-680-6.....	11BC-1
7931-67-740-1.....	11BD-1
7931-67-750-1.....	11BE-1
7931-67-760-1.....	11BF-1
7931-67-805-1.....	11BG-1
7931-67-815-1.....	11DG-1
7931-67-825-1.....	11BH-1
7931-67-835-1.....	11DF-1
7931-67-830-1.....	11BI-1
7931-67-840-1.....	11BJ-1
7931-67-850-1.....	11AS-1
7931-67-855-1.....	11BK-1
7931-67-870-1.....	11DE-1
7931-67-870-4.....	11DM-1

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

DE-ICE KIT INSTALLATION and PARTS - CONTENTS, continued

**NOTE:** Each section includes the installation instructions and parts list(s) for the applicable electric de-ice kit(s).

<u>De-ice Kit Part Number:</u>	<u>Section/Page</u>
7931-67-890-1.....	11DN-1
7931-67-896-1.....	11DD-1
7931-67-920-1.....	11BL-1
7931-67-925-1.....	11DO-1
7931-67-929-1.....	11BM-1
7931-67-931-1.....	11DG-1
7931-67-932-1.....	11DE-1
7931-67-933-1.....	11DF-1
7931-67-934-1.....	11BN-1
7931-67-939-1.....	11BO-1
7931-67-940-1.....	11H-1
7931-67-941-1.....	11BP-1
7931-67-942-1.....	11DG-1
7931-67-944-1.....	11DP-1
7931-77-025-1.....	11BQ-1
7931-77-045-1.....	11BR-1
7931-77-195-1.....	11BS-1
7931-77-870-1.....	11BT-1
7931-77-900-1A.....	11BU-1
7931-77-970-1.....	11BV-1
100020.....	11BW-1
101820-1.....	11BX-1
102014-1.....	11BY-1
102014-6.....	11BY-1
102195-1.....	11BZ-1
102282-1.....	11DN-1
102284-1.....	11CA-1
102418-1.....	11CB-1

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

DE-ICE KIT INSTALLATION and PARTS - CONTENTS, continued

**NOTE:** Each section includes the installation instructions and parts list(s) for the applicable electric de-ice kit(s).

<u>De-ice Kit Part Number:</u>	<u>Section/Page</u>
102418-3 .....	11CB-1
102441-1 .....	11DY-1
102441-2 .....	11DY-1
102544-1 .....	11CC-1
102600-1 .....	11F-1
102600-3 .....	11CD-1
102600-4 .....	11CD-1
102655-1 .....	11CE-1
102759-1 .....	11DL-1
102960-1 .....	11CF-1
102998-1 .....	11CB-1
103253 .....	11DQ-1
103262 .....	11CB-1
103294-1 .....	11H-1
103317 .....	11DL-1
103428 .....	11EF-1
103553 .....	11DH-1
103605 .....	11CG-1
103616 .....	11BJ-1
103719 .....	11CH-1
103769 .....	11CI-1
103794 .....	11DR-1
104116 .....	11CJ-1
104179 .....	11CK-1
104251 .....	11CL-1
104264 .....	11CM-1
104267 .....	11DS-1

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

DE-ICE KIT INSTALLATION and PARTS - CONTENTS, continued

**NOTE:** Each section includes the installation instructions and parts list(s) for the applicable electric de-ice kit(s).

<u>De-ice Kit Part Number:</u>	<u>Section/Page</u>
104334-1 .....	11CN-1
104522 - For Cessna (T)182(S,T) Only .....	11CO-1
104522 - For Cessna T206H Only .....	11CP-1
104779 .....	11DH-1
104876 .....	11DT-1
104996 .....	11CQ-1
105062 .....	11CR-1
105339 .....	11CS-1
105537 .....	11DL-1
105551 .....	11CT-1
105934 .....	11CU-1
106049 .....	11CV-1
106111 .....	11CW-1
106125 .....	11CX-1
106138 .....	11DU-1
106146 .....	11DU-1
106285 .....	11CY-1
106298 .....	11DV-1
106299 .....	11DV-1
106308 .....	11DU-1
106309 .....	11DU-1
106416 .....	11DW-1
106576 .....	11DX-1
106783 .....	11CZ-1
106818 .....	11CV-1
106831 .....	11DA-1
106863 .....	11EH-1
107020 .....	11DB-1

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

DE-ICE KIT INSTALLATION and PARTS - CONTENTS, continued

**NOTE:** Each section includes the installation instructions and parts list(s) for the applicable electric de-ice kit(s).

<u>De-ice Kit Part Number:</u>	<u>Section/Page</u>
107038 .....	11DC-1
107556 .....	11DZ-1
107570 .....	11EA-1
107597 .....	11CY-1
107608 .....	11EB-1
107716 .....	11EC-1
107982(X) .....	11EE-1
108004 .....	11ED-1
108052 .....	11EI-1
108342 .....	11DC-1
108424 .....	11EG-1
108584 .....	11EJ-1
108607 .....	11EK-1
109206 .....	11EL-1
109306 .....	11DU-1
109545 .....	11DV-1

<u>Appendix:</u>	<u>Section/Page</u>
1. Terminal Strip Hardware .....	App-1
A. Screws/Washers to Attach Wires to Terminal Strip .....	App-1
2. De-ice Overhaul Kits .....	App-2
A. General.....	App-2
B. Contents of the Kit.....	App-3

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

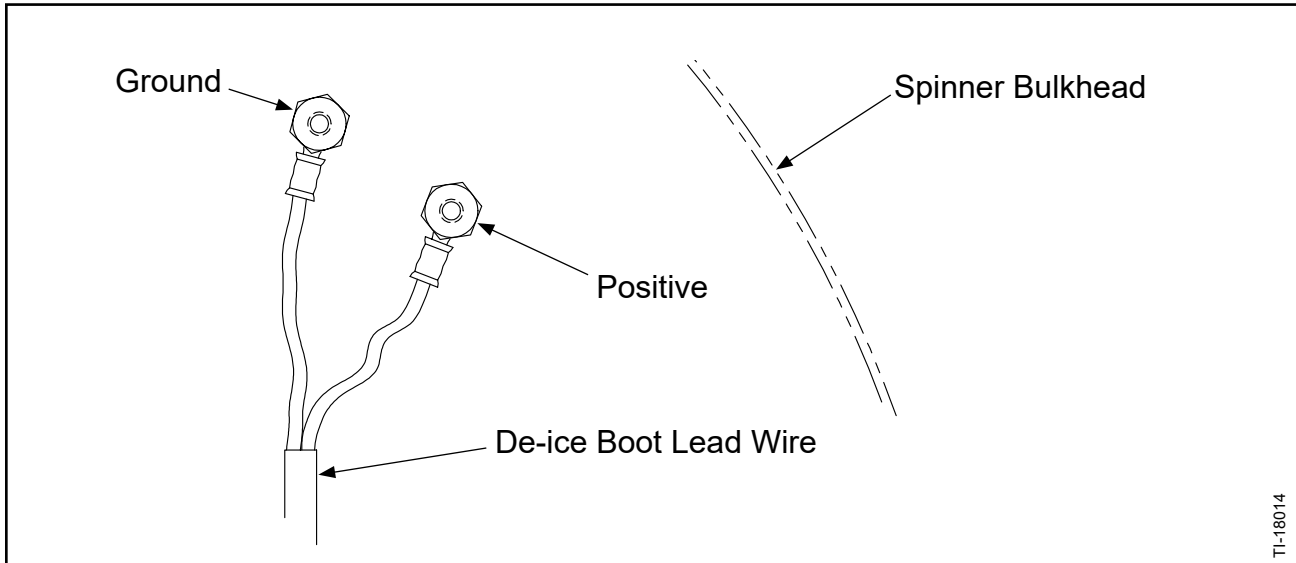
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2627-1 and 7931-5E2682-1**

**A. Installation Instruction 11A**

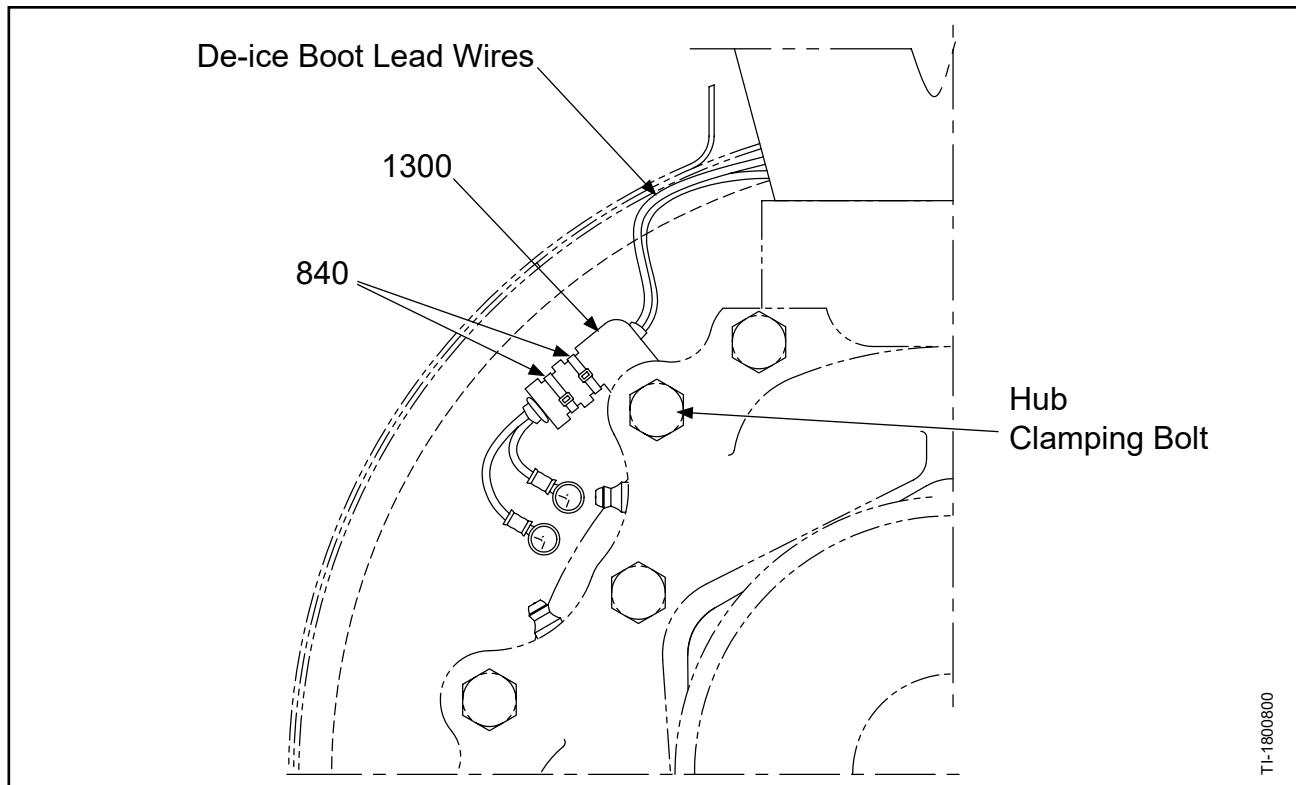
- (1) Make sure the de-ice boot lead wires lay flat against the bulkhead.  
Refer to Figure A-1.
  - (a) Twisting of the lead wires is not permitted.
- (2) Put the de-ice boot lead wire on the bracket (1300) with the O-ring positioned as shown in Figure A-2.
  - (a) Align the bracket (1300) with the hub as shown in Figure A-2.
- (3) Install the tie straps (840) as shown in Figure A-2.
- (4) Connect the de-ice boot lead wires and the slip ring wire harness (895) to the bulkhead. Refer to Figure A-1 and Figure A-3.
  - (a) Torque nut (300) 6-8 in. lbs. (0.6-0.9 N•m).
- (5) For a three blade de-ice installation, two of the three slip ring harness terminals are connected to a single set of posts on the starter ring gear assembly.
- (6) Using the hardware supplied with the slip ring drive pulley, install the terminal ends of the slip ring wire harness to the terminal studs of the slip ring drive pulley. Refer to Figure A-4.
- (7) Using the tie straps (1820), secure the slip ring wire harness (895) to the hub as shown in Figure A-4.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2627-1 and 7931-5E2682-1**



**Securing Slip Ring Wire Harness to Bulkhead  
Figure A-1**

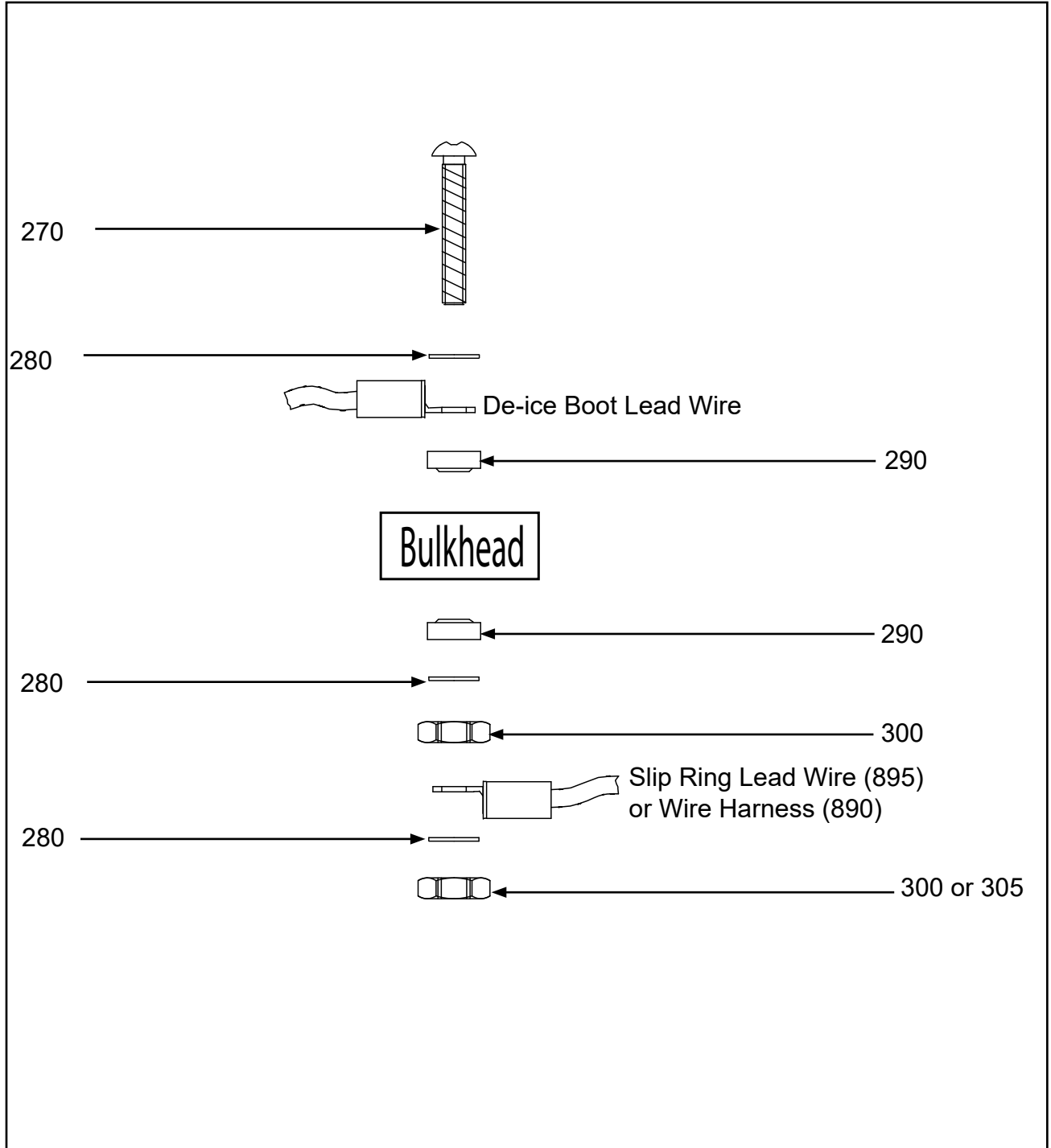


**Securing De-ice Boot Lead Wire to Bracket on Hub  
Figure A-2**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

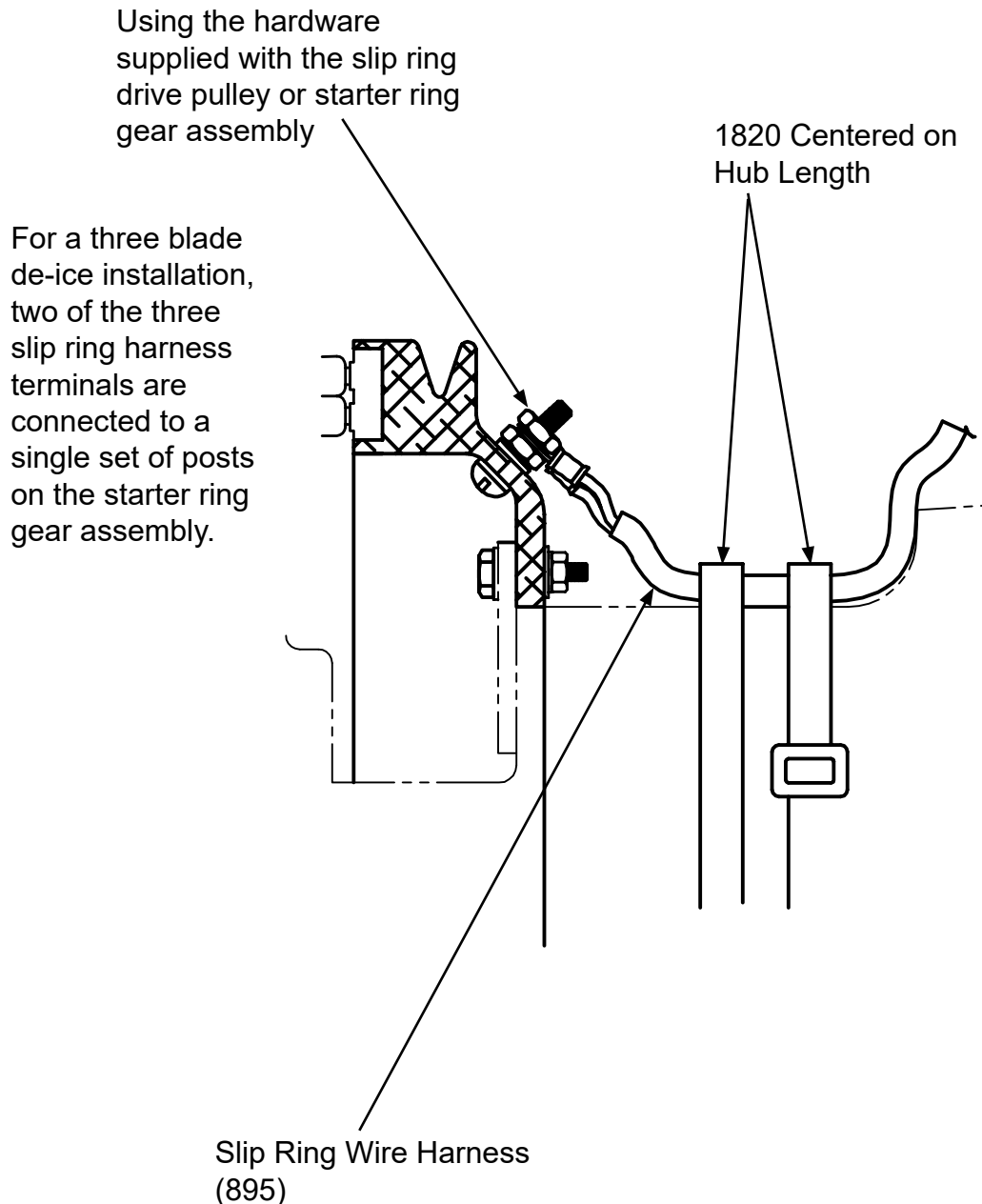
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2627-1 and 7931-5E2682-1**



**De-ice Boot Lead Wire and Slip Ring Lead Wire or Wire Harness to Bulkhead  
Figure A-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2627-1 and 7931-5E2682-1**



TL-18000134

**Securing De-ice Boot Lead Wire to Hub  
Figure A-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2627-1 and 7931-5E2682-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-5E2627-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11A</b> <b>FIGURES: A-1 thru A-4</b>		
270	B-7035-14	• SCREW, 6-32, PAN HEAD, BRASS	6	
280	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	18	Y
290	2H1260	• INSULATING BUSHING SUPERSEDES ITEM 290A	12	
290A	7931-2E1260	• INSULATING BUSHING 12 SUPERSEDED BY ITEM 290		
300	B-6641-265	• NUT, HEX, BRASS	6	Y
305	B-6641-265	• NUT, HEX, BRASS	6	Y
895	3H3158-2	• SLIP RING WIRE HARNESS SUPERSEDES ITEM 890A	3	Y
895A	7931-3E3158-2	• SLIP RING WIRE HARNESS SUPERSEDED BY ITEM 890	3	Y
1820	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	2	Y
840	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	6	Y
	<b>7931-5E2682-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11A</b> <b>FIGURES: A-1 thru A-4</b>		
270	B-7035-14	• SCREW, 6-32, PAN HEAD, BRASS	6	
280	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	18	Y
290	2H1260	• INSULATING BUSHING SUPERSEDES ITEM 290A	12	
290A	7931-2E1260	• INSULATING BUSHING SUPERSEDED BY ITEM 290	12	
300	B-6641-265	• NUT, HEX, BRASS	6	Y
305	B-6641-265	• NUT, HEX, BRASS	6	Y
895	3H3158-2	• SLIP RING WIRE HARNESS SUPERSEDES ITEM 890A	3	Y
895A	7931-3E3158-2	• SLIP RING WIRE HARNESS SUPERSEDED BY ITEM 890	3	Y
1820	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	2	Y
840	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	6	Y

- ITEM NOT ILLUSTRATED

**De-ice Kits: 7931-5E2627-1 and 7931-5E2682-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2627-1 and 7931-5E2682-1**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-5E2690-1**

**B.     Installation Instruction 11B**

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 5E2690 Rev. E

- 1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

- a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)
- b Hartzell Propeller Service Letter HC-SL-30-259
- c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2690-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-5E2690-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11B</b>		
	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-2	4	
	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-2	4	
	2H1365	• TAPPED EYELET SUPERSEDES 7931-2E1365	8	Y
	7931-2E1365	• TAPPED EYELET SUPERSEDED BY 2H1365	8	Y
	B-3854-41	• WASHER, LOCK	8	Y
	B-3854-41	• WASHER, LOCK	8	Y
	B-6637-34	• SCREW, PAN HEAD, CRES	8	Y
	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-2	4	
	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-3	4	
	B-6631-231	• SCREW, 6-32, FILLISTER HEAD, CRES	8	Y
	B-3854-41	• WASHER, LOCK	8	Y
	2H1852-3	• TERMINAL STRIP SPACER SUPERSEDES 7931-2E1852-3	4	
	7931-2E1852-3	• TERMINAL STRIP SPACER SUPERSEDED BY 2H1852-3	4	
	B-3855-31	• WASHER, LOCK, EXTERNAL TOOTH	4	Y
	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
	B-3854-42	• WASHER, LOCK	4	Y
	B-3853-F4	• CLAMP, LOOP, PLASTIC	4	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
	B-6583-0437	• SPRING PIN, 3/32	4	Y
	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	8	Y
	3H2526-1	• DE-ICE WIRE HARNESS SUPERSEDES 7931-3E2526-1	4	Y
	7931-3E2526-1	• DE-ICE WIRE HARNESS SUPERSEDED BY 3H2526-1	4	Y
	4H2661-1	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E2661-1	1	
	7931-4E2661-1	• SLIP RING ASSEMBLY SUPERSEDED BY 4H2661-1	1	
	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	8	Y
	B-6265	• BRACKET, WIRE HARNESS	4	

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-5E2690-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-5E2691-1**

C. Installation Instruction 11C

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 5E2691 Rev. B

- 1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)

b Hartzell Propeller Service Letter HC-SL-30-259

c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2691-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-5E2691-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11C</b>		
	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-2	5	
	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-2	5	
	B-3854-41	• WASHER, LOCK	10	Y
	B-6631-233	• SCREW, 6-32, FILLISTER HEAD, CRES	10	Y
	B-6735	• CLAMP, LOOP, CUSHIONED	5	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	5	Y
	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	5	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	10	Y
	4H2369-5	• DE-ICE WIRE HARNESS SUPERSEDES 7931-4E2369-5	5	Y
	7931-4E2369-5	• DE-ICE WIRE HARNESS SUPERSEDED BY 4H2369-5	5	Y
	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	15	Y
	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	10	Y
	7931-4E1988-1	• SLIP RING ASSEMBLY SUPERSEDED BY 4H1988-1	1	
	4H1988-1	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E1988-1	1	
	B-3384-8H	• BOLT, 1/4-28, HEX HEAD	10	Y
	B-7077-52	• BELLEVILLE SPRING WASHER	10	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	10	Y
	B-3837-0432	• WASHER, CORROSION RESISTANT	10	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-5E2691-1**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2705-1 and 7931-5E2707-1**

**D.     Installation Instruction 11D**

- (1) Make sure the de-ice boot lead wires lay flat against the bulkhead in accordance with Figure D-1.
- (2) Position the de-ice boot lead wire on the wire harness bracket with the O-ring as shown in Figure D-1.

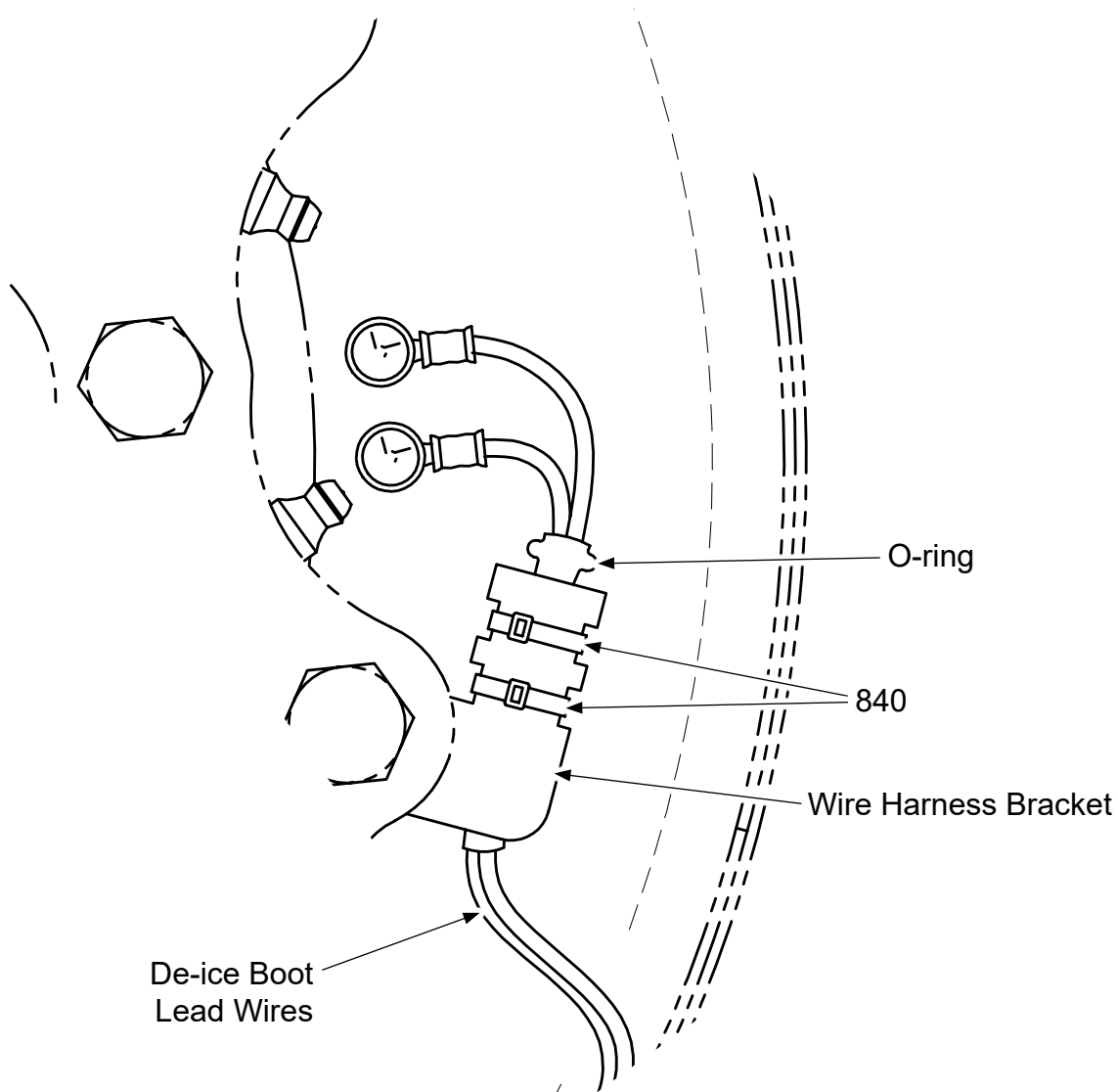
**NOTE:**     The wire harness bracket is installed on the hub in accordance with the assembly instructions in the applicable propeller overhaul/maintenance manual.

**CAUTION:**     DE-ICE BOOT LEAD WIRES MUST LAY FLAT.  
TWISTING OF THE LEAD WIRES IS NOT PERMITTED.

- (3) Install the tie straps (840) as shown in Figure D-1.
- (4) Connect the de-ice boot lead wires and the slip ring wire harness (895) to the bulkhead in accordance with Figure D-1 and Figure D-2.
- (5) Torque the nut (300) and nut (305) to 6-8 in. lbs. (0.6-0.9 N•m).
- (6) Torque the nut (305) to 10-12 in. lbs. (1.1-1.3 N•m).
- (7) Using the hardware supplied with the slip ring drive pulley, install the terminal ends of the slip ring wire harness (895) onto the terminal studs of the slip ring drive pulley. Refer to Figure D-3.
- (8) Attach the slip ring wire harness (895) to the hub with the tie straps (1820) as shown in Figure D-3.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

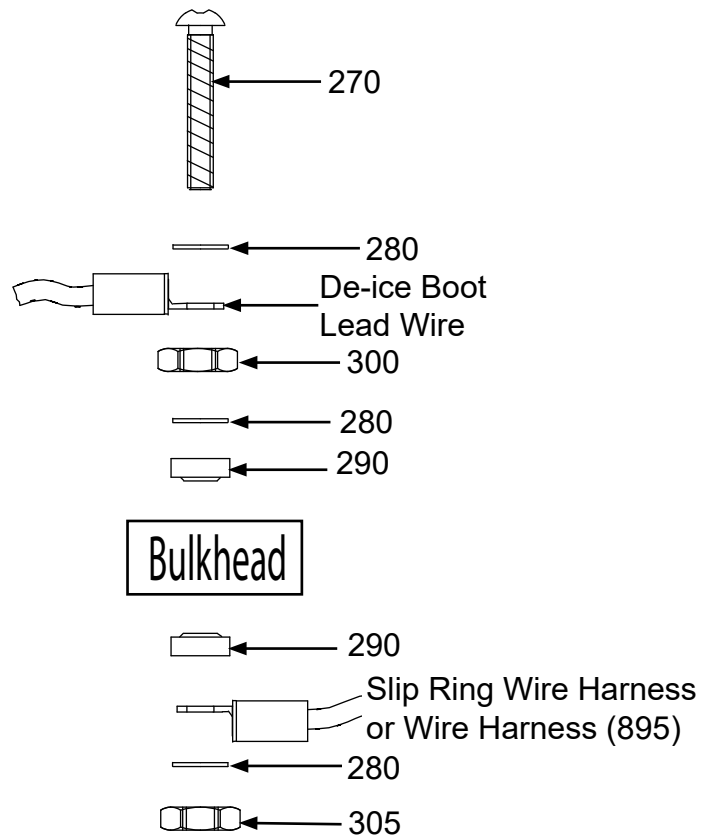
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2705-1 and 7931-5E2707-1**



**De-ice Boot Lead Wire Bracket  
Figure D-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

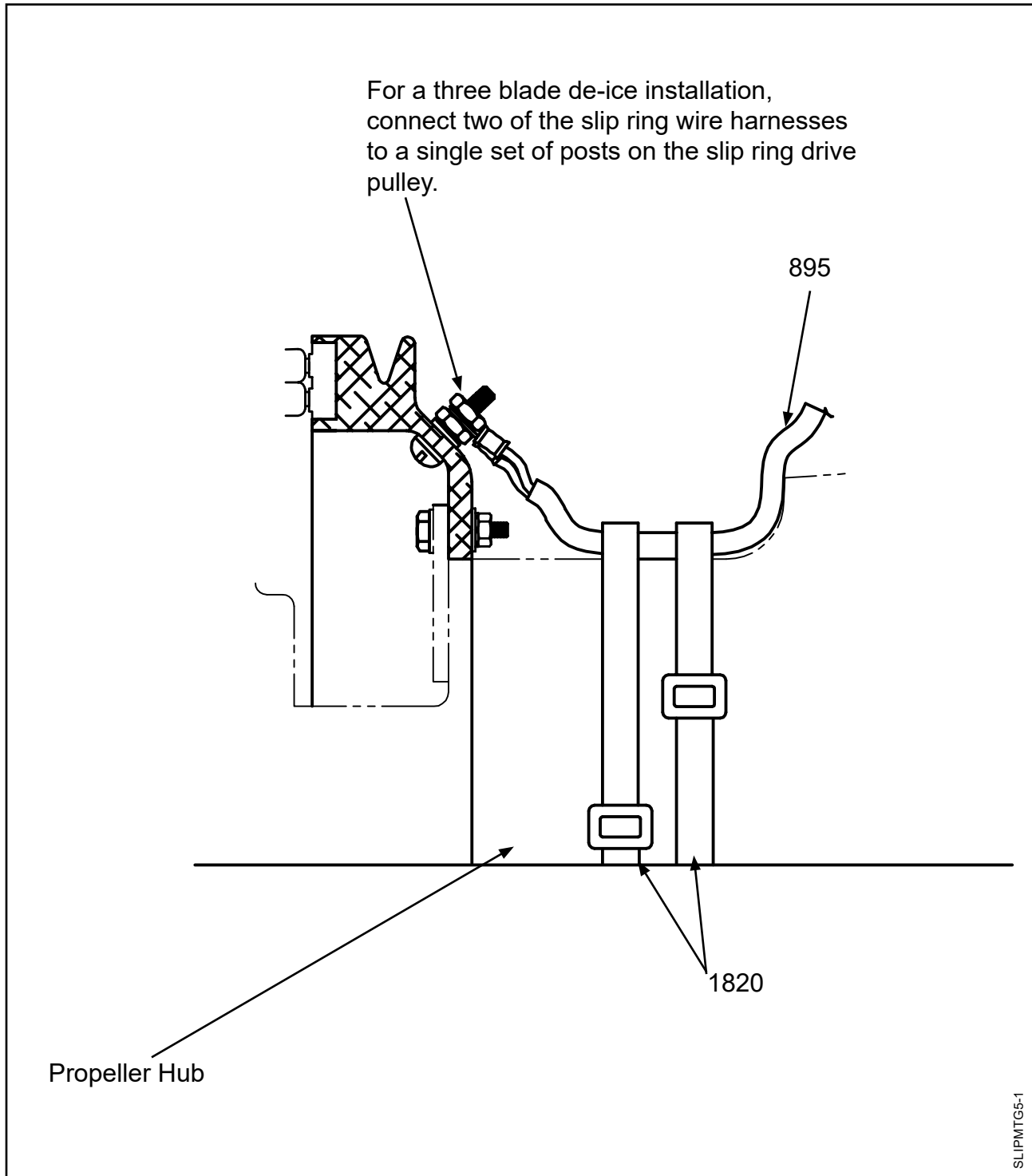
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2705-1 and 7931-5E2707-1**



**De-ice Boot Lead Wire/Slip Ring Lead Wire Hardware  
Figure D-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2705-1 and 7931-5E2707-1**



**Slip Ring Wire Harness Attachment to Slip Ring Pulley and Hub  
Figure D-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2705-1 and 7931-5E2707-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-5E2705-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11D</b> <b>FIGURES: D-1 thru D-3</b>		
840	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	6	Y
895	3H3158-2	• WIRE HARNESS, SLIP RING SUPERSEDES ITEM 890A	3	Y
895A	7931-3E3158-2	• WIRE HARNESS, SLIP RING SUPERSEDED BY ITEM 890	3	Y
1820	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	2	Y
270	B-7035-12	• SCREW, 6-32, PAN HEAD, BRASS	6	
280	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	18	
290	2H1260	• INSULATING BUSHING SUPERSEDES ITEM 290A	12	
290A	7931-2E1260	• INSULATING BUSHING SUPERSEDED BY ITEM 290	12	
300	B-6641-265	• NUT, HEX, BRASS	6	
305	B-6641-265	• NUT, HEX, BRASS	6	

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-5E2705-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2705-1 and 7931-5E2707-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-5E2707-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTIONS 11D</b> <b>FIGURES: D-1 thru D-3</b>		
840	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	6	Y
895	3H3158-2	• WIRE HARNESS, SLIP RING SUPERSEDES ITEM 890A	3	Y
895A	7931-3E3158-2	• WIRE HARNESS, SLIP RING SUPERSEDED BY ITEM 890	3	Y
1820	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	2	Y
270	B-7035-12	• SCREW, 6-32, PAN HEAD, BRASS	6	
280	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	18	
290	2H1260	• INSULATING BUSHING SUPERSEDES ITEM 290A	12	
290A	7931-2E1260	• INSULATING BUSHING SUPERSEDED BY ITEM 290	12	
300	B-6641-265	• NUT, HEX, BRASS	6	
305	B-6641-265	• NUT, HEX, BRASS	6	

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-5E2707-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-5E2715-1**

E. Installation Instruction 11E

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 5E5715 Rev. J

- 1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)

b Hartzell Propeller Service Letter HC-SL-30-259

c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2715-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-5E2715-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11E</b>		
	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-3	3	
	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-3	3	
	B-3854-41	• WASHER, LOCK	6	Y
	B-6631-233	• SCREW, 6-32, FILLISTER HEAD, CRES	6	Y
	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	3	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	3	Y
	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	3	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	3	Y
	3H2092-2	• WIRE HARNESS SUPERSEDES 7931-3E2092-2	3	Y
	7931-3E2092-2	• WIRE HARNESS SUPERSEDED BY 3H2092-2	3	Y
	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	3	Y
	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	6	Y
	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	6	Y
	4H2551-1	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E2551-1	1	
	7931-4E2551-1	• SLIP RING ASSEMBLY SUPERSEDED BY 4H2551-1	1	
	A-2070-10	• SCREW, 1/4-28, BUTTON HEAD	12	Y
	B-7077-52	• BELLEVILLE SPRING WASHER	24	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	12	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit: 7931-5E2715-1**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2748-1 and 102600-1**

**F. Installation Instruction 11F**

- (1) Position the propeller blades at low blade angle or start lock angle.
- (2) Route the terminal end of the wire harness (890) through the hole in counterweight, as shown in Figure F-1.
- (3) Assemble the plug connection between the wire harness (890) and the de-ice boot.
- (4) Install and tighten the tie strap (900) around the wire harness/de-ice boot plug connection.
- (5) Position the tie strap head (900) in the approximate location shown in Figure F-1.
- (6) Install the clear vinyl tubing over the wire harness (890) until the clear vinyl tubing contacts the heat shrink tubing installed on the wire harness (890).
- (7) Install the AMP terminals (975) on the lead wires in accordance with the manufacturer's instructions.
- (8) Secure the wire harness/boot connection to the counterweight.
  - (a) Outboard Tie Strap (910) installation:
    - 1 Install tie straps (910) under the tie strap (900) connecting the wire harness/boot plugs, around the counterweight, and over the wire harness (890) as shown in Figure F-1.
    - 2 Position the tie strap head in the approximate location shown on the side of the counterweight as shown in Figure F-1. Do not tighten the tie strap (910) at this time.
  - (b) Inboard Tie Strap (910) installation:
    - 1 Install tie straps (910) under the tie strap (900) connecting the wire harness/boot plugs, around the counterweight, and under the wire harness (890) as shown in Figure F-1.
    - 2 Position the tie strap head in the approximate location shown on the side of the counterweight as shown in Figure F-1. Do not tighten the tie strap (910) at this time.
  - (c) Verify the wire harness (890) is taut through the counterweight hole.
  - (d) Tighten all of the tie straps (900 and 910).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

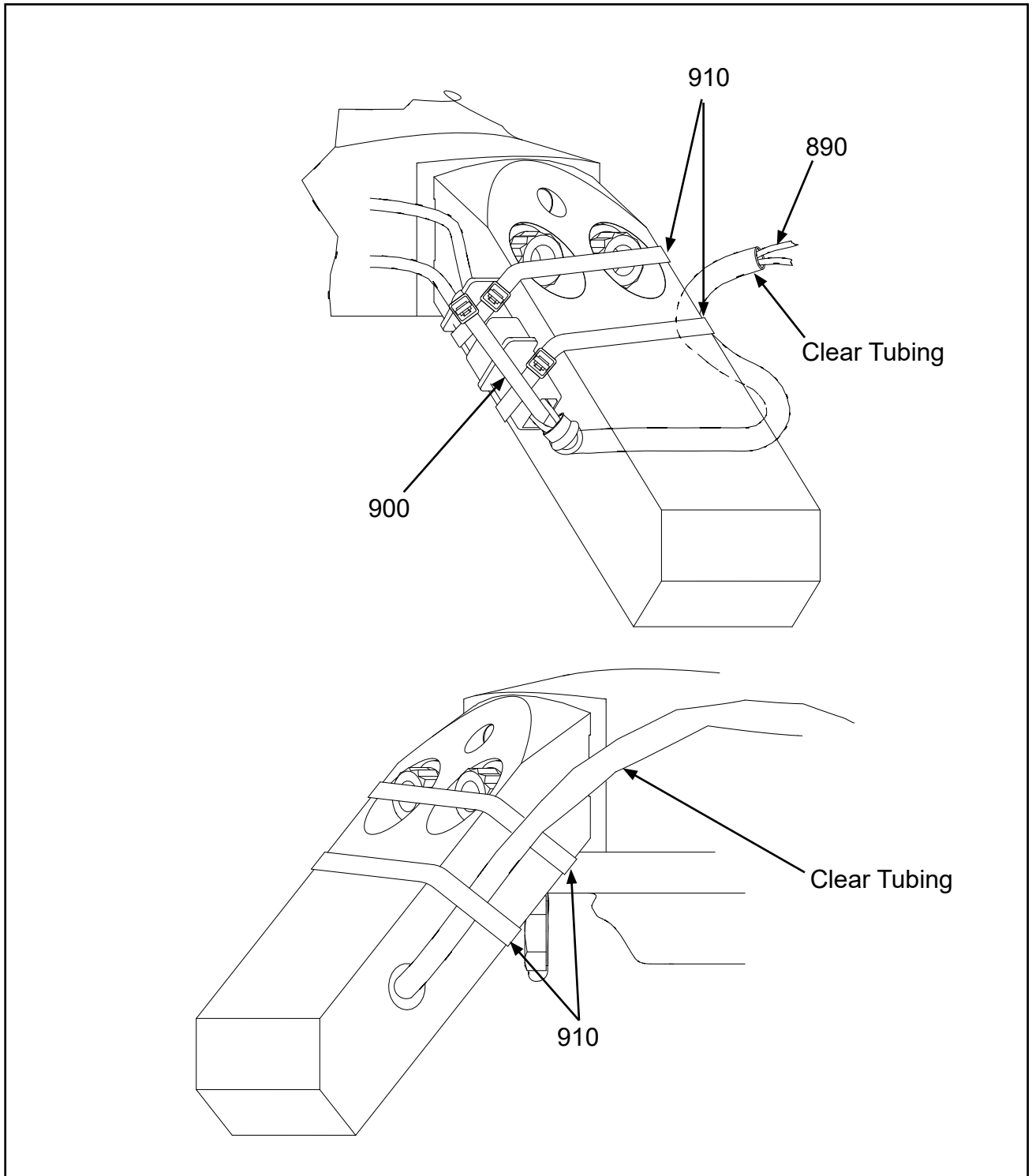
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2748-1 and 102600-1**

F. Installation Instruction 11F - continued

- (9) Using screw (270), washer (280), insulating bushings (290), and nut (300 and/or 305), connect the de-ice wire harness (890) and the slip ring wire harness (895) to the bulkhead in accordance with Figure F-2.
- (10) Torque the nut (300) to 6-8 in. lbs. (0.6-0.9 N•m) and nut (305) 10-12 in. lbs. (1.1-1.3 N•m).
- (11) Using the lead clip (360), screw (350), washer (370) and nut (380), route the de-ice wire harness (890) as shown and attach to the bulkhead in accordance with Figure F-3 and Figure F-4.
  - (a) Tighten the nut (380) until snug.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

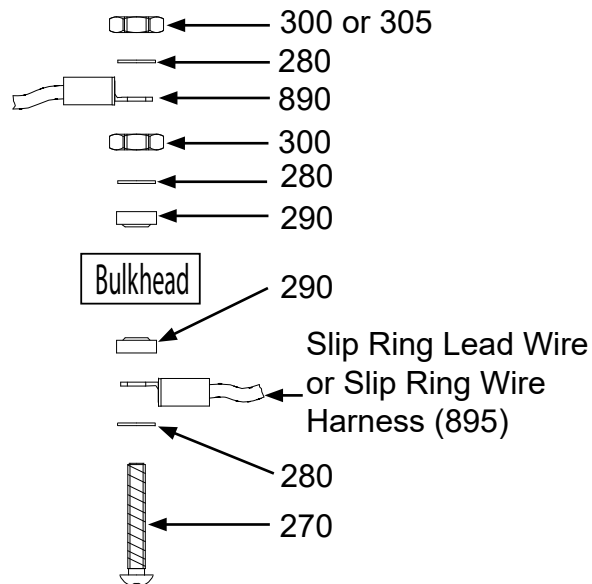
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2748-1 and 102600-1**



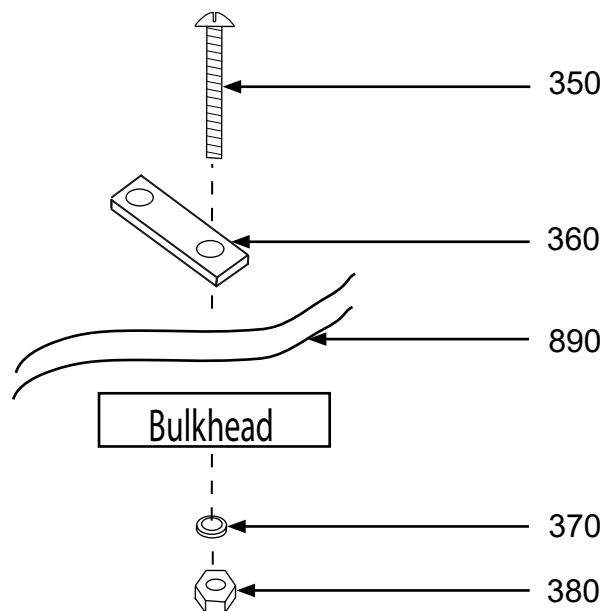
**Wire Harness to Counterweight Attachment  
Figure F-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2748-1 and 102600-1**



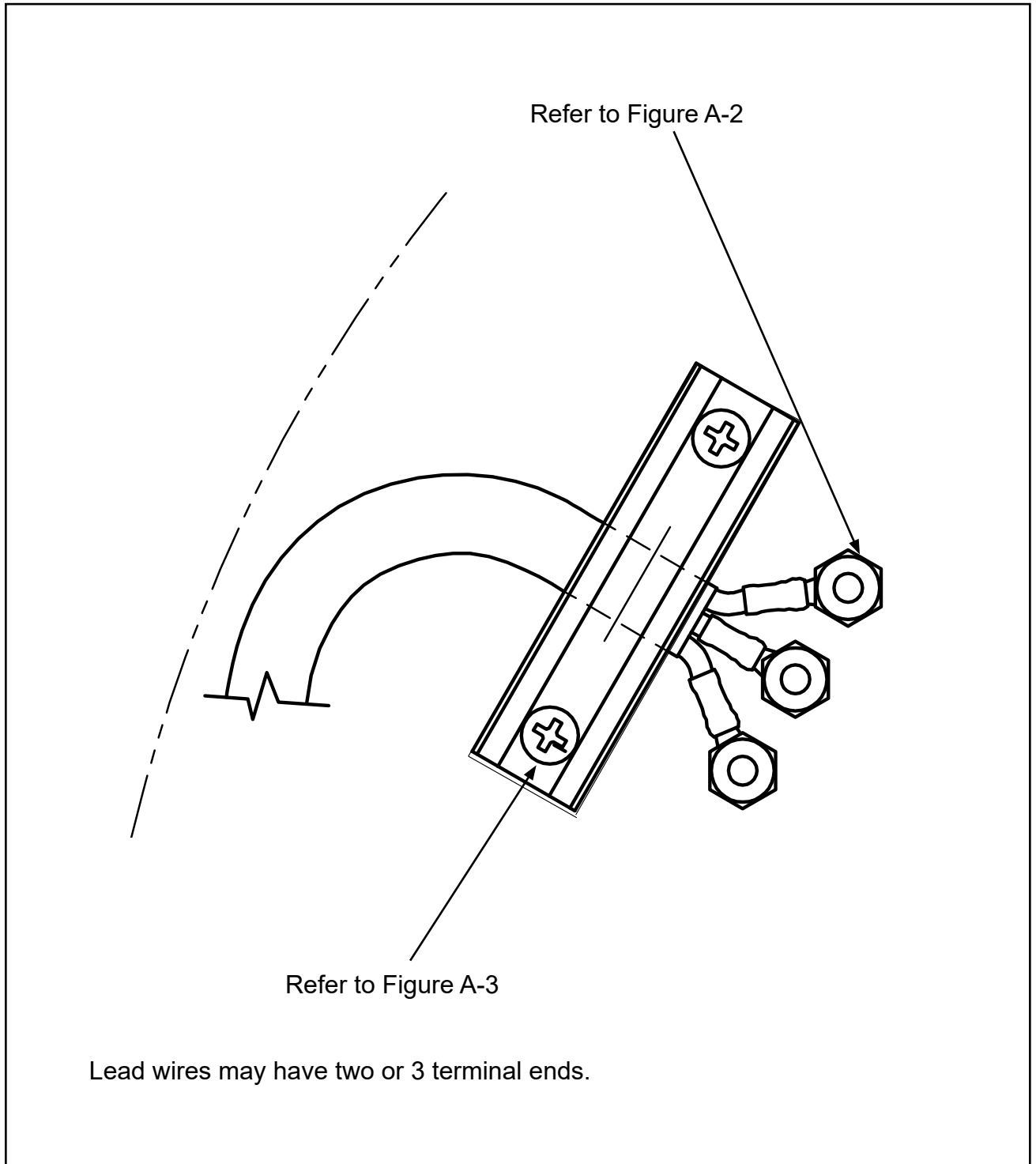
**Securing De-ice Wire Harness and Slip Ring Lead Wire to Bulkhead  
Figure F-2**



**Lead Clip Attachment to Bulkhead  
Figure F-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2748-1 and 102600-1**



**De-ice Wire Harness Routing  
Figure F-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2748-1 and 102600-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-5E2748-1</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 11F FIGURES: F-1 thru F-4</b>		
270	B-7035-12	• SCREW, 6-32, PAN HEAD, BRASS	9	
280	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	27	
290	7931-2E1260	• INSULATING BUSHING SUPERSEDED BY ITEM 290A	18	Y
290A	2H1260	• INSULATING BUSHING SUPERSEDES ITEM 290	18	Y
300	B-6641-265	• NUT, HEX, BRASS	18	
350	B-6637-30	• SCREW, PAN HEAD, CRES.	6	
360	7931-3E1271-2	• CLIP, LEAD STRAP SUPERSEDED BY ITEM 360A	3	
360A	3H1271-2	• CLIP, LEAD STRAP SUPERSEDES ITEM 360	3	
370	B-3837-N632	• WASHER, CORROSION RESISTANT	6	Y
380	B-6655-06	• NUT, HEX, SELF-LOCKING	6	Y
890	7931-4E1967-3	• WIRE HARNESS, KIT SUPERSEDED BY ITEM 890A	3	Y
890A	4H1967-3	• WIRE HARNESS, KIT SUPERSEDES ITEM 890	3	Y
900	B-3852-1-0	• • STRAP, TIEDOWN, PLASTIC	1	
910	B-3852-2-0	• • STRAP, TIEDOWN, PLASTIC	2	Y
975	101902	• • TERMINAL, RING	3	
975A	7931-320619	• • AMP 320619 PIDG RING TERMINAL ALTERNATE FOR ITEM 975	3	
975B	7931-2-320619-1	• • AMP 320619 PIDG RING TERMINAL ALTERNATE FOR ITEM 975	3	
	SAE-AMS-I-7444	• • CLEAR VINYL TUBING		

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-5E2748-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2748-1 and 102600-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>102600-1</b>	<b>PROPELLER AND AIRFRAME DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11F</b> <b>FIGURES: F-1 thru F-4</b>		
270	B-7035-14	• SCREW, 6-32, PAN HEAD, BRASS	6	
280	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	18	Y
290	2H1260	• INSULATING BUSHING	12	
300	B-6641-265	• NUT, HEX, BRASS	12	Y
350	B-6637-30	• SCREW, PAN HEAD, CRES.	6	
360	3H1271-2	• CLIP, LEAD STRAP	3	
370	B-3837-N632	• WASHER, CORROSION RESISTANT	6	Y
380	B-6655-06	• NUT, HEX, SELF-LOCKING	6	Y
890	3H2050	• WIRE HARNESS	3	Y
900	B-3852-1-0	• • STRAP, TIEDOWN, PLASTIC	1	Y
910	B-3852-2-0	• • STRAP, TIEDOWN, PLASTIC	2	Y
975	101902	• • TERMINAL, RING	3	
975A	7931-320619	• • AMP 320619 PIDG RING TERMINAL ALTERNATE FOR ITEM 975	3	
975B	7931-2-320619-1	• • AMP 320619 PIDG RING TERMINAL ALTERNATE FOR ITEM 975	3	
	SAE-AMS-I-7444	• • CLEAR VINYL TUBING		

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 102600-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2748-1 and 102600-1**

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This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2782-1 and 7931-5E2792-1**

**G. Installation Instruction 11G**

- (1) Using the bolts (1160 and 1170), Belleville spring washers (1180), washers (1200 and 1210), and nuts (1190), attach the slip ring (1140) to the spinner split mounting plate as shown in Figure G-1.
  - (a) Torque the bolts (1160) to 40-120 in. lbs. (4.51-13.55 N•m).
  - (b) Perform slip ring run-out check in accordance with the Check chapter of this manual.
- (2) Position the propeller blades at reverse blade angle.
- (3) Assemble the plug connection between the wire harness (890) and the de-ice boot.
- (4) Install the tie strap (920) around the wire harness/de-ice boot plug connection. Do not tighten at this time.
- (5) Secure the wire harness/de-ice boot connection to the clamp.
  - (a) Install tie straps (930) under the tie strap (920) connecting the wire harness/de-ice boot plugs, and around the clamp as shown in Figure G-2. Do not tighten at this time.
  - (b) Position the inboard tie strap (930) inboard of the lubrication fitting.
  - (c) Position the outboard tie strap (930) outboard of the lubrication fitting.
  - (d) Position the tie strap head in the approximate location shown on the side of the clamp as shown in Figure G-2. Do not tighten the tie strap (930) at this time.
- (6) Route the wire harness (890) over the inboard tie strap (930) and under the outboard tie strap (930) as shown in Figure G-2.
- (7) Using a tie strap (920), secure the de-ice boot lead wire to the outboard tie strap (930) as shown in Figure G-2. Do not tighten at this time.
- (8) Using tie strap (920), secure the wire harness (890) to the outboard tie strap (930) as shown in Figure G-2.
- (9) The tie straps (920) must be located as shown in Figure 11G-2. Do not tighten at this time.
- (10) Position the wire harness/de-ice boot plug connection as shown in Figure G-2.

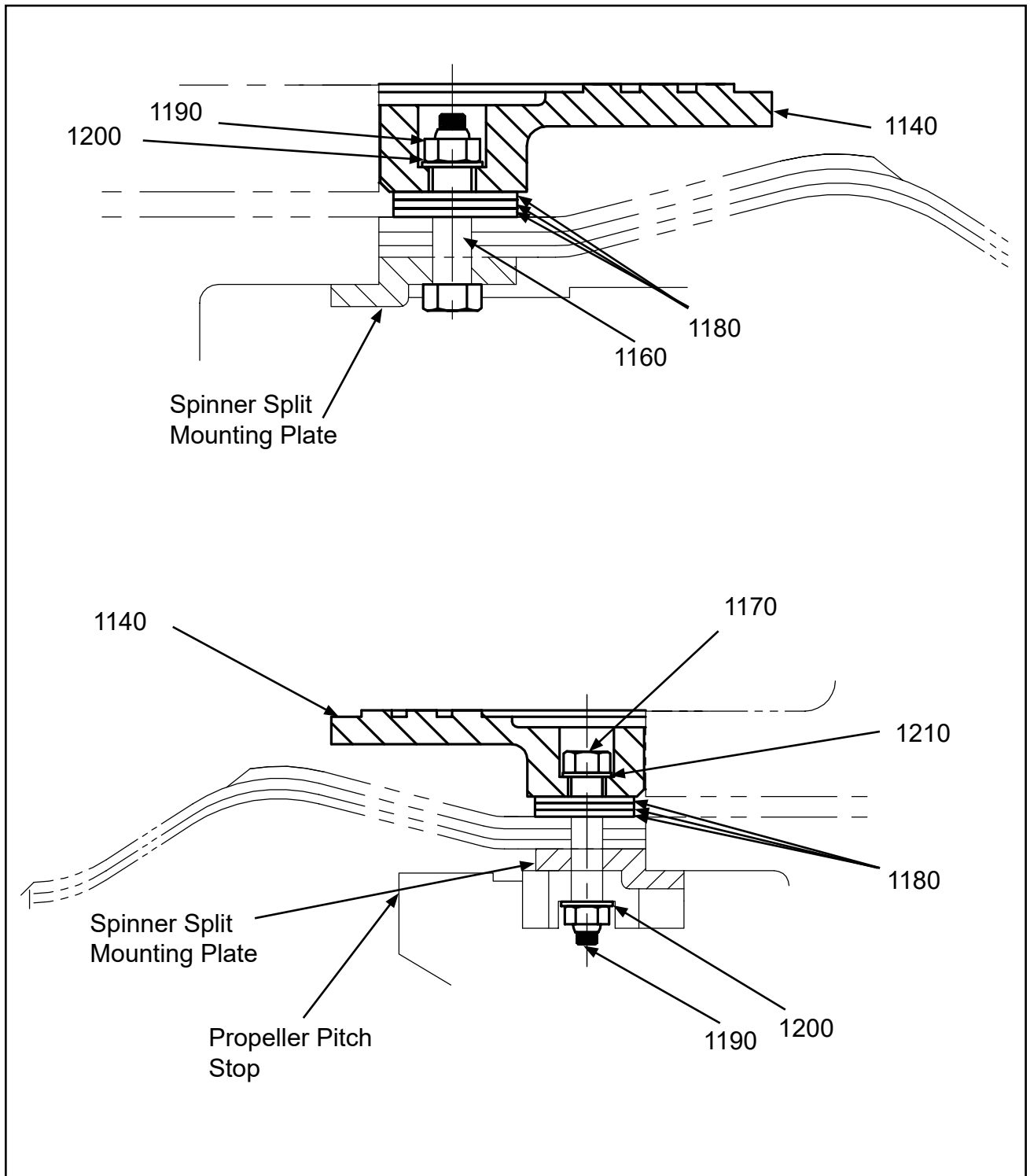
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2782-1 and 7931-5E2792-1**

G. Installation Instruction 11G - continued

- (11) Tighten all the tie straps (920 and 930).
- (12) Using screws (220) and washers (200) attach the terminal strip (170) to the bulkhead in accordance with Figure G-3.
- (13) Torque the screws (220) to 10-12 in. lb. (1.12-1.35 N•m).
- (14) Install the slip ring lead wires and de-ice wire harness (890) to the terminal strip (170) in accordance with Figure G-4.
  - (a) Tighten the terminal strip screws until snug.
- (15) Install the clamp (590) around the wire harness (890) as shown in Figure G-5.
- (16) Using screws (610), washers (620 or 630), and nuts (600), install the clamp (590) to the bulkhead in accordance with the applicable configuration shown in Figure G-5.
  - (a) Orient the centerline of the clamp (590) parallel to terminal strip (170) as shown in Figure G-5.
- (17) Torque the screw (610) to 22-25 in. lbs. (2.48-2.82 N•m).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

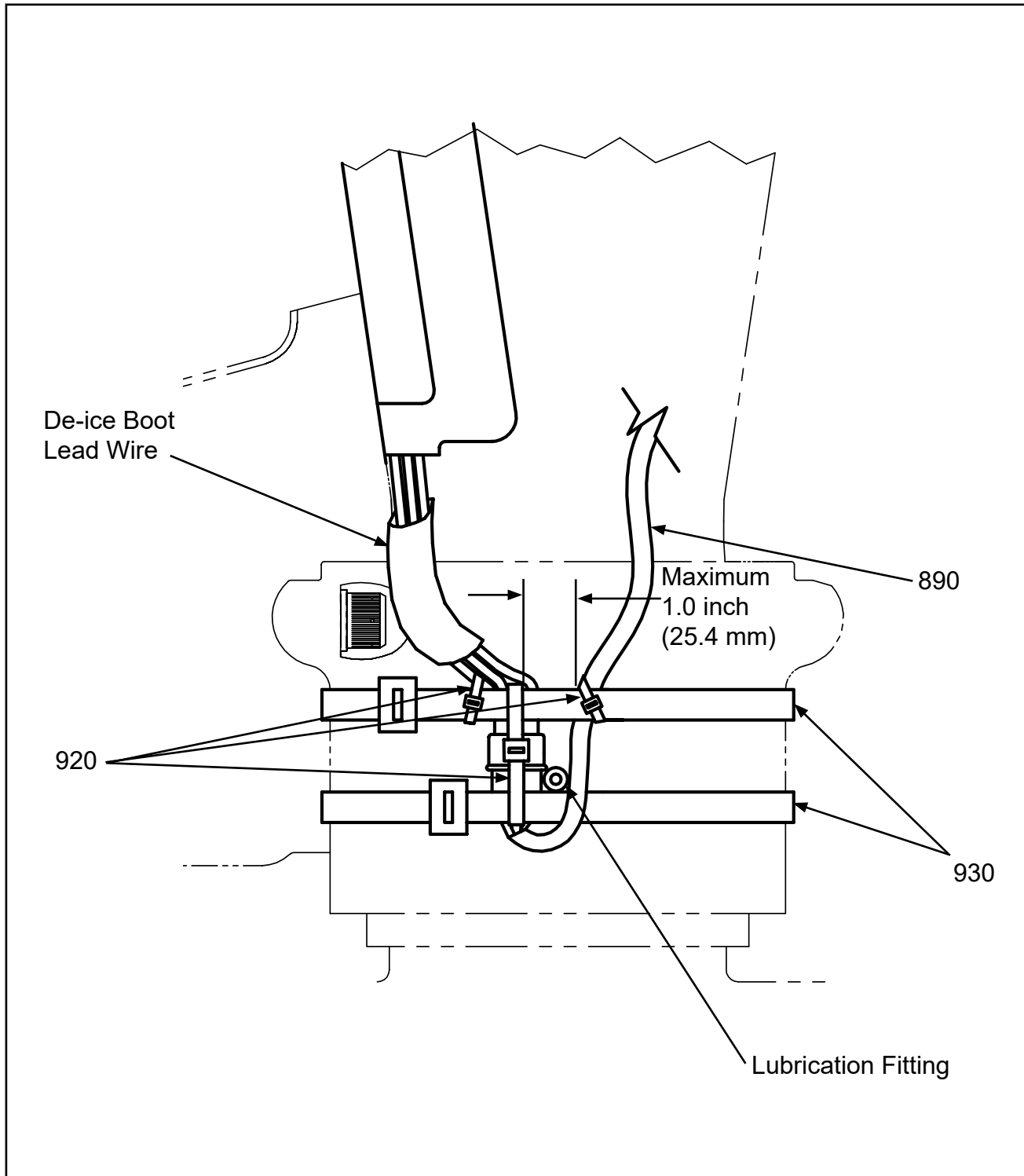
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2782-1 and 7931-5E2792-1**



**Slip Ring Mounting  
Figure G-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

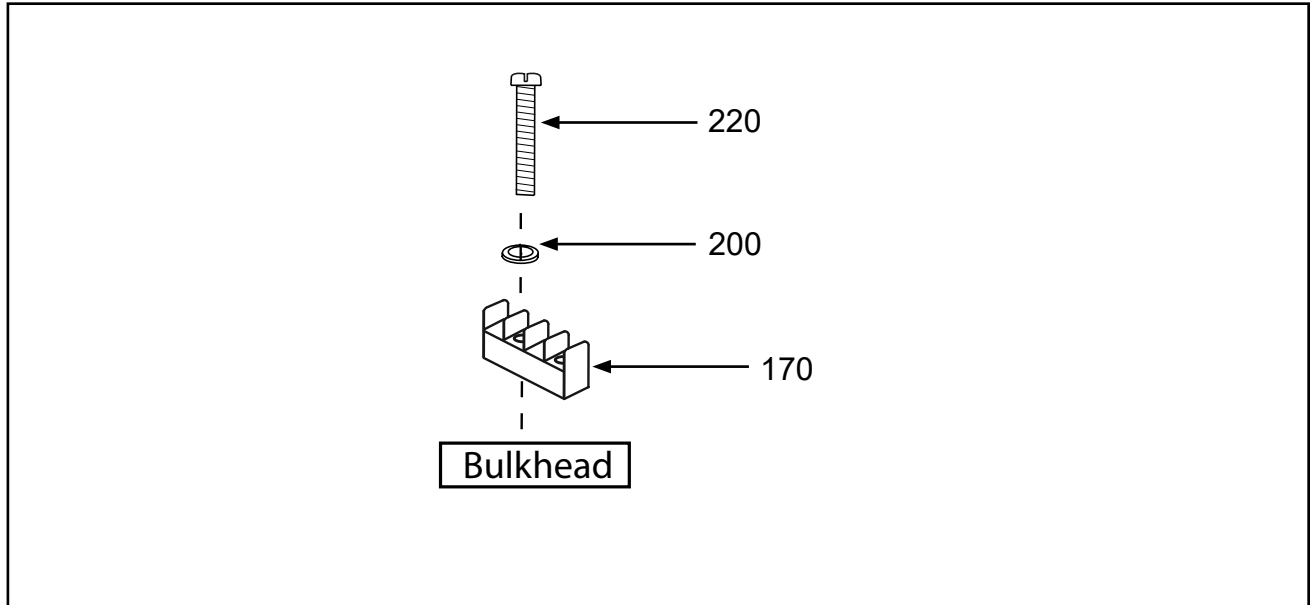
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2782-1 and 7931-5E2792-1**



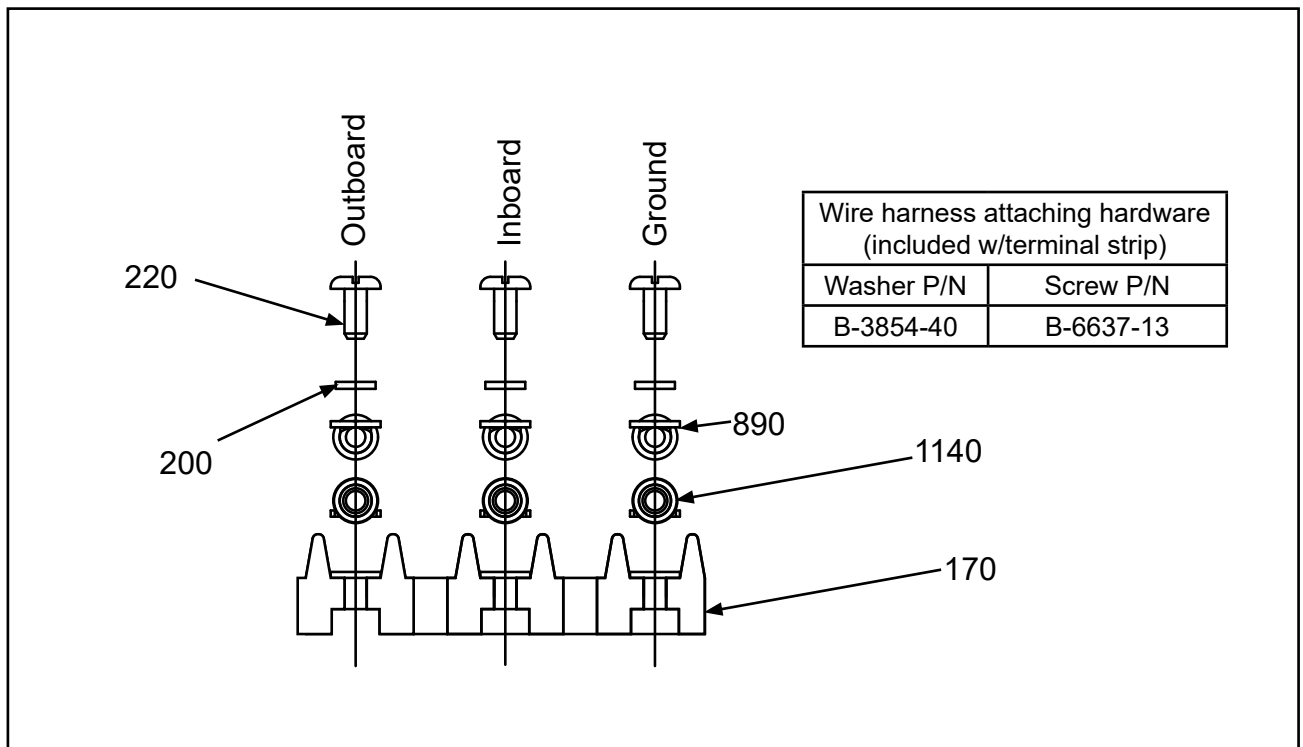
**Wire Harness and Tie Straps to Clamp  
Figure G-2**

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions for the following electric de-ice kit(s):  
**7931-5E2782-1 and 7931-5E2792-1**



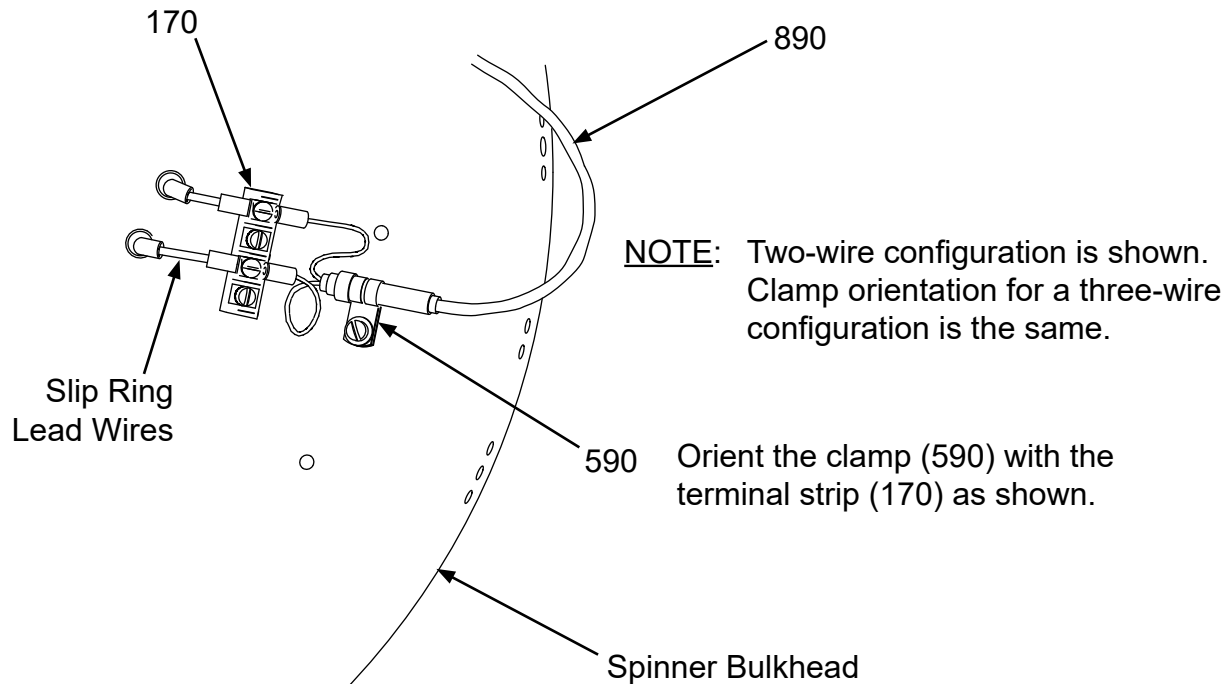
**Terminal Strip to Bulkhead Attachment**  
**Figure G-3**



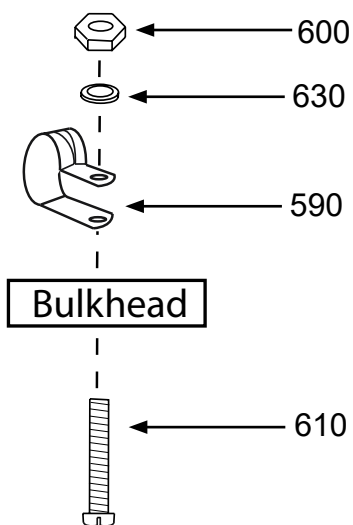
**Lead Wire to Terminal Strip Attachment**  
**Figure G-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

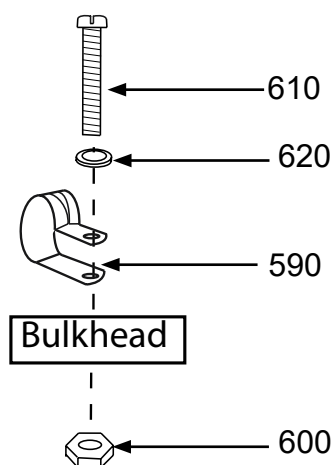
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2782-1 and 7931-5E2792-1**



**7931-5E2792-1**



**7931-5E2782-1**



**Loop Clamp to Bulkhead Attachment  
Figure G-5**

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2782-1 and 7931-5E2792-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-5E2782-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11G</b> <b>FIGURES: G-1 thru G-5</b>		
170	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES ITEM 170A	4	
170A	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY ITEM 170	4	
200	B-3854-41	• WASHER, LOCK	8	Y
220	B-6631-233	• SCREW, 6-32, FILLISTER HEAD, CRES	8	Y
590	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	4	Y
600	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
610	B-3856-246	• SCREW, 8-32, HEAD, CRES	4	Y
620	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
890	4H2369-1	• DE-ICE WIRE HARNESS SUPERSEDES ITEM 890A	4	Y
890A	7931-4E2369-1	• DE-ICE WIRE HARNESS SUPERSEDED BY ITEM 890	4	Y
920	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	12	Y
930	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	8	Y
1140	7931-4E1964-4	• SLIP RING ASSEMBLY SUPERSEDED BY ITEM 1140A	1	
1140A	4H1964-4	• SLIP RING ASSEMBLY SUPERSEDES ITEM 1140	1	
1160	102831	• BOLT, 1/4-28, HEX HEAD	4	Y
1170	B-3384-25H	• BOLT, 1/4-28, HEX HEAD	8	Y
1180	B-7076-42	• BELLEVILLE SPRING WASHER	36	Y
1190	B-3808-4	• NUT, HEX, SELF-LOCKING	12	Y
1200	B-3837-0432	• WASHER, CORROSION RESISTANT	12	Y
1210	B-3837-0432	• WASHER, CORROSION RESISTANT	8	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-5E2782-1**

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2782-1 and 7931-5E2792-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-5E2792-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTIONS 11G</b> <b>FIGURES: G-1 thru G-5</b>		
170	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES ITEM 170A	4	
170A	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY ITEM 170	4	
200	B-3854-41	• WASHER, LOCK	8	Y
220	B-6631-233	• SCREW, 6-32, FILLISTER HEAD, CRES	8	Y
590	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	4	Y
600	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
610	B-3856-246	• SCREW, 8-32, HEAD, CRES	4	Y
630	B-3837-N832	• WASHER, CORROSION RESISTANT	8	Y
890	4H2369-1	• DE-ICE WIRE HARNESS SUPERSEDES ITEM 890A	4	Y
890A	7931-4E2369-11	• DE-ICE WIRE HARNESS SUPERSEDED BY ITEM 890	4	Y
920	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	12	Y
930	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	8	Y
1140	7931-4E1964-4	• SLIP RING ASSEMBLY SUPERSEDED BY ITEM 1140A	1	
1140A	4H1964-4	• SLIP RING ASSEMBLY SUPERSEDES ITEM 1140	1	
1160	102831	• BOLT, 1/4-28, HEX HEAD	4	Y
1170	B-3384-25H	• BOLT, 1/4-28, HEX HEAD	8	Y
1180	B-7076-42	• BELLEVILLE SPRING WASHER	36	Y
1190	B-3808-4	• NUT, HEX, SELF-LOCKING	12	Y
1200	B-3837-0432	• WASHER, CORROSION RESISTANT	12	Y
1210	B-3837-0432	• WASHER, CORROSION RESISTANT	8	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-5E2792-1**



This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-5E2793-1, 7931-67-940-1, and 103294-1**

H. Installation Instruction 11H

- (1) Position the propeller blades at low blade angle or start lock angle.
- (2) Route the terminal end of the wire harness (890) through the hole in counterweight, as shown in Figure H-1.
- (3) Assemble the plug connection between the wire harness (890) and the de-ice boot.
- (4) Install and tighten the tie strap (900) around the wire harness/de-ice boot plug connection.
- (5) Position the tie strap head (900) in the approximate location shown in Figure H-1.
- (6) Install the clear vinyl tubing over the wire harness (890) until the clear vinyl tubing contacts the heat shrink tubing installed on the wire harness (890).
- (7) Install the AMP terminals (975) on the lead wires in accordance with the manufacturer's instructions.
- (8) Secure the wire harness/boot connection to the counterweight.
  - (a) Outboard Tie Strap (910) installation:
    - 1 Install tie straps (910) under the tie strap (900) connecting the wire harness/boot plugs, around the counterweight, and over the wire harness (890) as shown in Figure H-1.
    - 2 Position the tie strap head in the approximate location shown on the side of the counterweight as shown in Figure H-1. Do not tighten the tie strap (910) at this time.
  - (b) Inboard Tie Strap (910) installation:
    - 1 Install tie straps (910) under the tie strap (900) connecting the wire harness/boot plugs, around the counterweight, and under the wire harness (890) as shown in Figure H-1.
    - 2 Position the tie strap head in the approximate location shown on the side of the counterweight as shown in Figure H-1. Do not tighten the tie strap (910) at this time.
  - (c) Verify the wire harness (890) is taut through the counterweight hole.
  - (d) Tighten all of the tie straps (900 and 910).

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

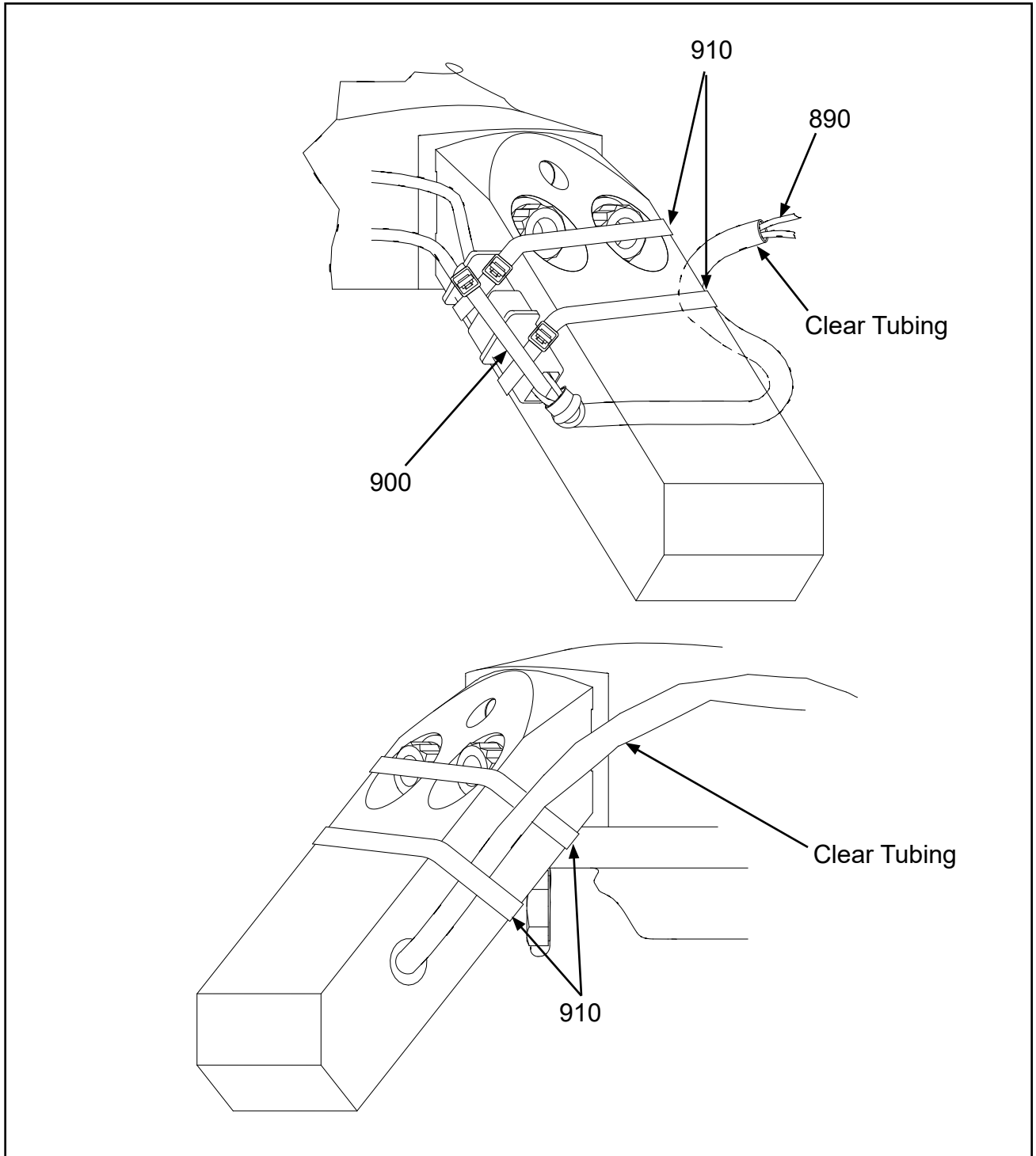
**7931-5E2793-1, 7931-67-940-1, and 103294-1**

H. Installation Instruction 11H - continued

- (9) Using screw (270), washer (280), insulating bushings (290), and nut (300 and/or 305), connect the de-ice wire harness (890) and the slip ring wire harness (895) to the bulkhead in accordance with Figure H-2.
- (10) Torque the nut (300) to 6-8 in. lbs. (0.6-0.9 N•m) and nut (305) 10-12 in. lbs. (1.1-1.3 N•m).
- (11) Using the lead clip (360), screw (350), washer (370) and nut (380), route the de-ice wire harness (890) as shown and attach to the bulkhead in accordance with Figure H-3 and Figure H-4.
- (12) Tighten the nut (380) until snug.
- (13) Using tie straps (930) secure slip ring wire harness (895) to the hub as shown in Figure H-5.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2793-1, 7931-67-940-1, and 103294-1**

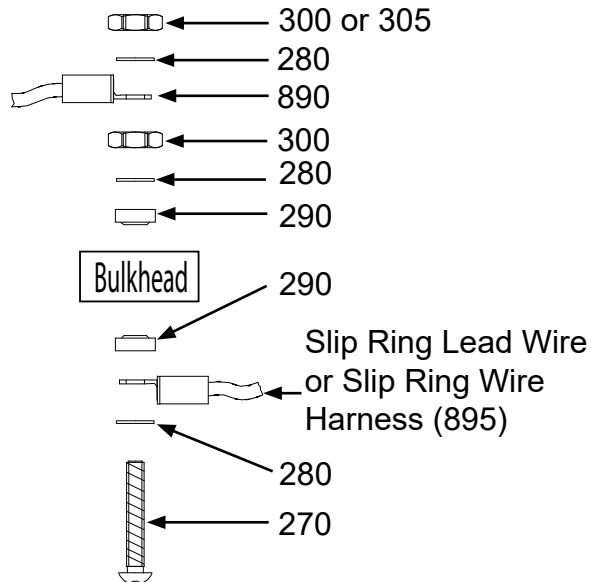


**Wire Harness to Counterweight Attachment  
Figure H-1**

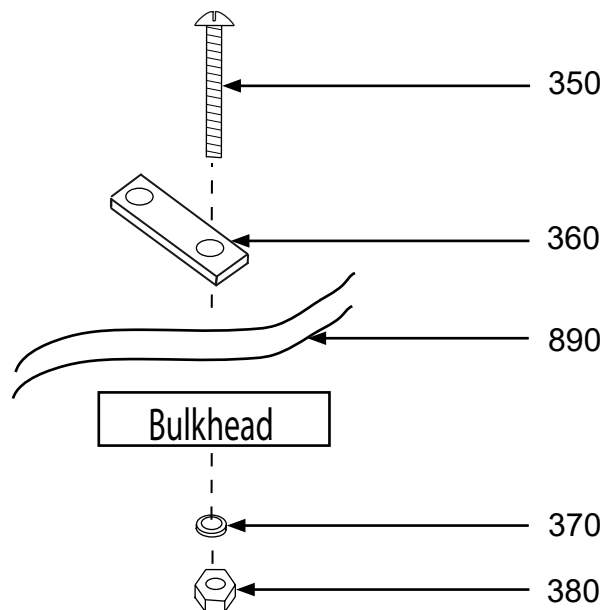
**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-5E2793-1, 7931-67-940-1, and 103294-1**



**Securing De-ice Wire Harness and Slip Ring Lead Wire to Bulkhead  
Figure H-2**

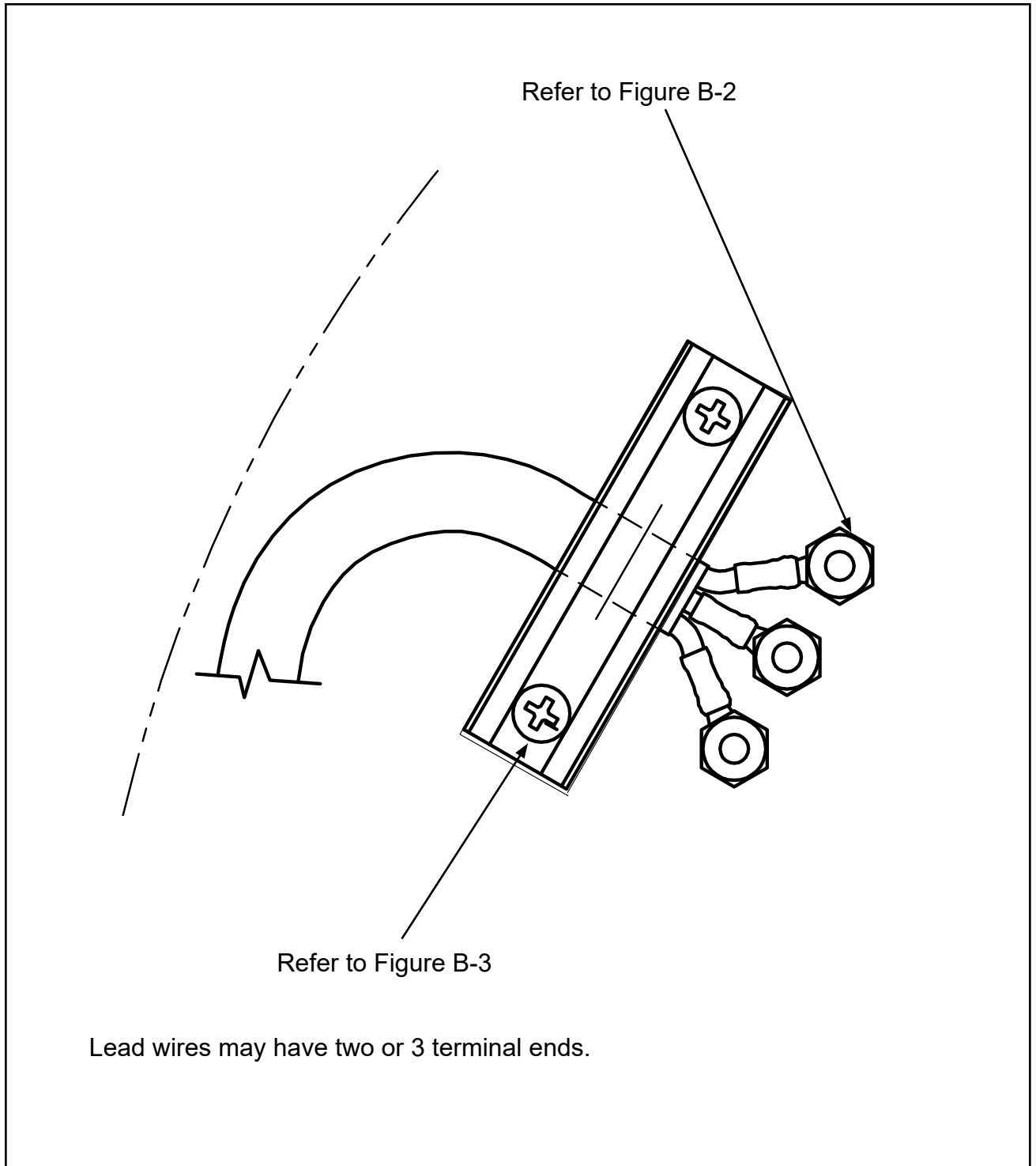


**Lead Clip Attachment to Bulkhead  
Figure H-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-5E2793-1, 7931-67-940-1, and 103294-1**

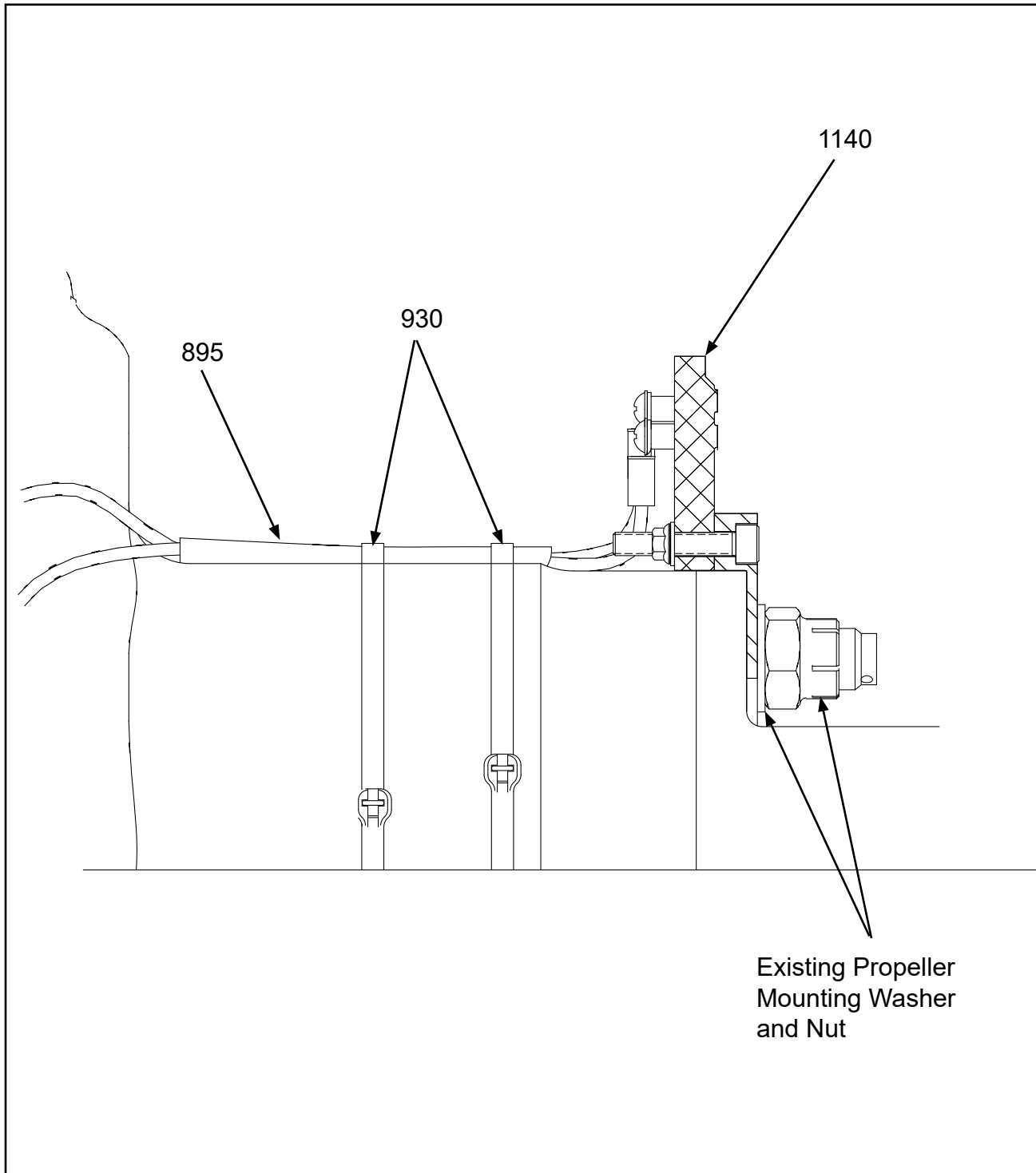


**De-ice Wire Harness Routing  
Figure H-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-5E2793-1, 7931-67-940-1, and 103294-1**



**Tie Straps Holding Slip Ring Wire Harness to Hub  
Figure H-5**

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-5E2793-1, 7931-67-940-1, and 103294-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-5E2793-1</b>	<b>AIRFRAME DE-ICE KIT - NO A/C AND MCCAULEY PROPELLER INSTALLATION INSTRUCTION 11H FIGURES: H-1 thru H-5</b>		
270	B-7035-14	• SCREW, 6-32, PAN HEAD, BRASS	6	
280	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	18	Y
290	7931-2E1260	• INSULATING BUSHING SUPERSEDED BY ITEM 290A	18	
290A	2H1260	• INSULATING BUSHING SUPERSEDES ITEM 290	18	
300	B-6641-265	• NUT, HEX, BRASS	12	Y
350	B-6637-30	• SCREW, PAN HEAD, CRES.	6	
360	7931-3E1271-2	• CLIP, LEAD STRAP SUPERSEDED BY ITEM 360A	3	
360A	3H1271-2	• CLIP, LEAD STRAP SUPERSEDES ITEM 360	3	
370	B-3837-N632	• WASHER, CORROSION RESISTANT	6	Y
380	B-6655-06	• NUT, HEX, SELF-LOCKING	6	Y
890	7931-3E2050	• WIRE HARNESS SUPERSEDED BY ITEM 890A	3	Y
890A	3H2050	• WIRE HARNESS SUPERSEDES ITEM 890	3	Y
900	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	1	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	2	Y
975	101902	• TERMINAL, RING	2	
975A	7931-320619	• AMP 320619 PIDG RING TERMINAL ALTERNATE FOR ITEM 975	2	
975B	7931-2-320619-1	• AMP 320619 PIDG RING TERMINAL ALTERNATE FOR ITEM 975	2	
895	SAE-AMS-I-7444 3H2113	• CLEAR VINYL TUBING • WIRE HARNESS, SLIP RING SUPERSEDES ITEM 895A	3	Y
895A	7931-3E2113	• WIRE HARNESS, SLIP RING SUPERSEDED BY ITEM 895	3	Y
930	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	2	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 7931-5E2793-1**

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2793-1, 7931-67-940-1, and 103294-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-940-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11H FIGURES: H-1 thru H-5</b>		
270	B-7035-14	• SCREW, 6-32, PAN HEAD, BRASS	6	
280	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	18	Y
290	7931-2E1260	• INSULATING BUSHING SUPERSEDED BY ITEM 290A	12	
290A	2H1260	• INSULATING BUSHING SUPERSEDES ITEM 290	12	
300	B-6641-265	• NUT, HEX, BRASS	12	Y
350	B-6637-30	• SCREW, PAN HEAD, CRES.	6	
360	7931-3E1271-2	• CLIP, LEAD STRAP SUPERSEDED BY ITEM 360A	3	
360A	3H1271-2	• CLIP, LEAD STRAP SUPERSEDES ITEM 360	3	
370	B-3837-N632	• WASHER, CORROSION RESISTANT	6	Y
380	B-6655-06	• NUT, HEX, SELF-LOCKING	6	Y
890	7931-3E2050	• WIRE HARNESS SUPERSEDED BY ITEM 890A	3	Y
890A	3H2050	• WIRE HARNESS SUPERSEDES ITEM 890	3	Y
900	B-3852-1-0	• • STRAP, TIEDOWN, PLASTIC	1	Y
910	B-3852-2-0	• • STRAP, TIEDOWN, PLASTIC	2	Y
975	101902	• • TERMINAL, RING	2	
975A	7931-320619	• • AMP 320619 PIDG RING TERMINAL ALTERNATE FOR ITEM 975	2	
975B	7931-2-320619-1	• • AMP 320619 PIDG RING TERMINAL ALTERNATE FOR ITEM 975	2	
	SAE-AMS-I-7444	• • CLEAR VINYL TUBING		
895	7931-3E2113	• WIRE HARNESS, SLIP RING SUPERSEDED BY ITEM 895A	3	Y
895A	3H2113	• WIRE HARNESS, SLIP RING SUPERSEDES ITEM 895	3	Y
930	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	2	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 7931-67-940-1**



# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-5E2793-1, 7931-67-940-1, and 103294-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>103294-1</b>	<b>PROPELLER DE-ICE KIT INSTALLATION INSTRUCTION 11H FIGURES: H-1 thru H-5</b>		
270	B-7035-14	• SCREW, 6-32, PAN HEAD, BRASS	6	
280	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	18	Y
290	2H1260	• INSULATING BUSHING	12	
300	B-6641-265	• NUT, HEX, BRASS	6	Y
305	102856-C06	• NUT, SELF-LOCKING, THIN	6	Y
350	B-6637-30	• SCREW, PAN HEAD, CRES.	6	
360	3H1271-2	• CLIP, LEAD STRAP	3	
370	B-3837-N632	• WASHER, CORROSION RESISTANT	6	Y
380	B-6655-06	• NUT, HEX, SELF-LOCKING	6	Y
890	3H2050	• WIRE HARNESS	3	Y
900	B-3852-1-0	• • STRAP, TIEDOWN, PLASTIC	1	Y
910	B-3852-2-0	• • STRAP, TIEDOWN, PLASTIC	2	Y
975	101902	•• TERMINAL, RING	2	
975A	7931-320619	•• AMP 320619 PIDG RING TERMINAL ALTERNATE FOR ITEM 975	2	
975B	7931-2-320619-1	•• AMP 320619 PIDG RING TERMINAL ALTERNATE FOR ITEM 975	2	
	SAE-AMS-I-7444	• • CLEAR VINYL TUBING		
895	3H2113	• WIRE HARNESS, SLIP RING	3	Y
930	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	2	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 103294-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2793-1, 7931-67-940-1, and 103294-1**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2796-1**

I. Installation Instruction 11I

(1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

(a) 5E2796 Rev. A

1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)

b Hartzell Propeller Service Letter HC-SL-30-259

c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-5E2796-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-5E2796-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11I</b>		
	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-3	3	
	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-3	3	
	B-3854-41	• WASHER, LOCK	6	Y
	B-6631-232	• SCREW, 6-32, FILLISTER HEAD, CRES	6	Y
	B-6735	• CLAMP, LOOP, CUSHIONED	3	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	3	Y
	B-3866-50	• SCREW, 8-32, 100° HEAD, CRES	3	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	3	Y
	3H2507-1	• DE-ICE WIRE HARNESS SUPERSEDES 7931-3E2507-1	3	Y
	7931-3E2507-1	• DE-ICE WIRE HARNESS SUPERSEDED BY 3H2507-1	3	Y
	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	3	Y
	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	6	Y
	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	6	Y
	7931-4E2714-1	• SLIP RING ASSEMBLY	1	
	B-3384-23	• BOLT, 1/4-28, HEX HEAD	6	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	6	Y
	B-3837-0432	• WASHER, CORROSION RESISTANT	18	Y
	B-3837-0463	• WASHER, CORROSION RESISTANT	12	Y
	B-3855-33	• WASHER, LOCK, EXTERNAL TOOTH	6	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit: 7931-5E2796-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2803-1**

**J.     Installation Instruction 11J**

(1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

(a) 5E2803 Rev. B

1     Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

a     The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)

b     Hartzell Propeller Service Letter HC-SL-30-259

c     Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-5E2803-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-5E2803-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11J</b>		
	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-3	3	
	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-3	3	
	B-3854-41	• WASHER, LOCK	6	Y
	B-6631-233	• SCREW, 6-32, FILLISTER HEAD, CRES	6	Y
	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	3	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	3	Y
	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	3	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	3	Y
	7931-3E2092-2	• WIRE HARNESS SUPERSEDED BY 3H2092-2	3	Y
	3H2092-2	• WIRE HARNESS SUPERSEDES 7931-3E2092-2	3	Y
	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	9	Y
	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	6	Y
	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	3	Y
	7931-4E2551-1	• SLIP RING ASSEMBLY SUPERSEDED BY 4H2551-1	1	
	4H2551-1	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E2551-1	1	
	A-2070-9	• SCREW, 1/4-28, BUTTON HEAD	3	Y
	A-2070-10	• SCREW, 1/4-28, BUTTON HEAD	9	Y
	B-7077-52	• BELLEVILLE SPRING WASHER	24	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	12	Y
	B-3837-0432	• WASHER, CORROSION RESISTANT	12	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit: 7931-5E2803-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E5706-1**

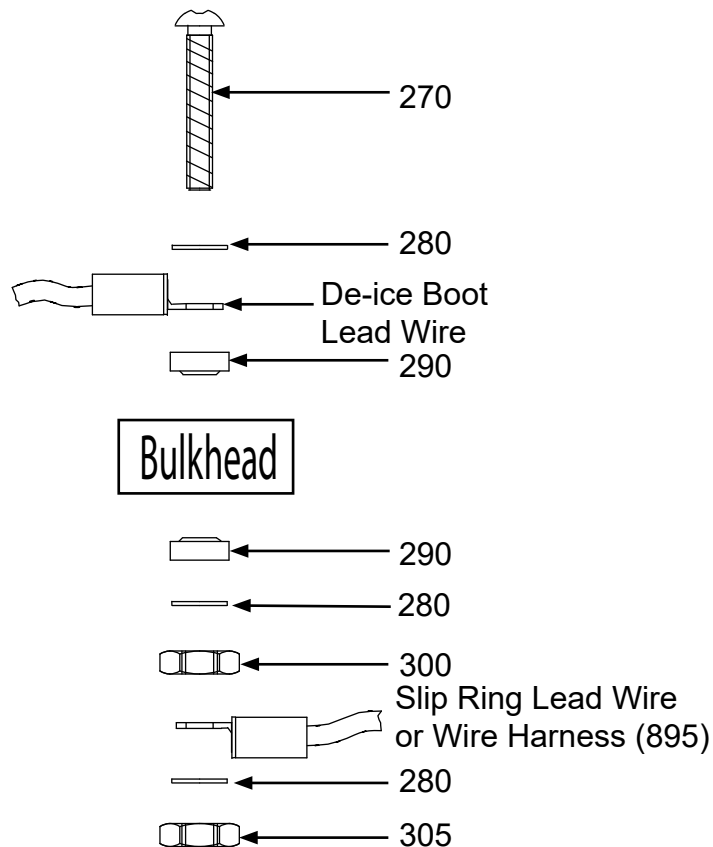
**K.     Installation Instruction 11K**

- (1) Connect the de-ice boot lead wires and the slip ring wire harness lead wires to the bulkhead using Figure K-1 and Figure K-2.
- (2) Torque the nut (300) and nut (305) to 6-8 in. lbs. (0.6-0.9 N•m).
- (3) Torque the nut (305) to 10-12 in. lbs. (1.1-1.3 N•m).
- (4) Use the lead clip to de-ice boot leadstrap to the bulkhead using Figure K-2 and Figure K-3. Tighten until snug.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-5E5706-1**



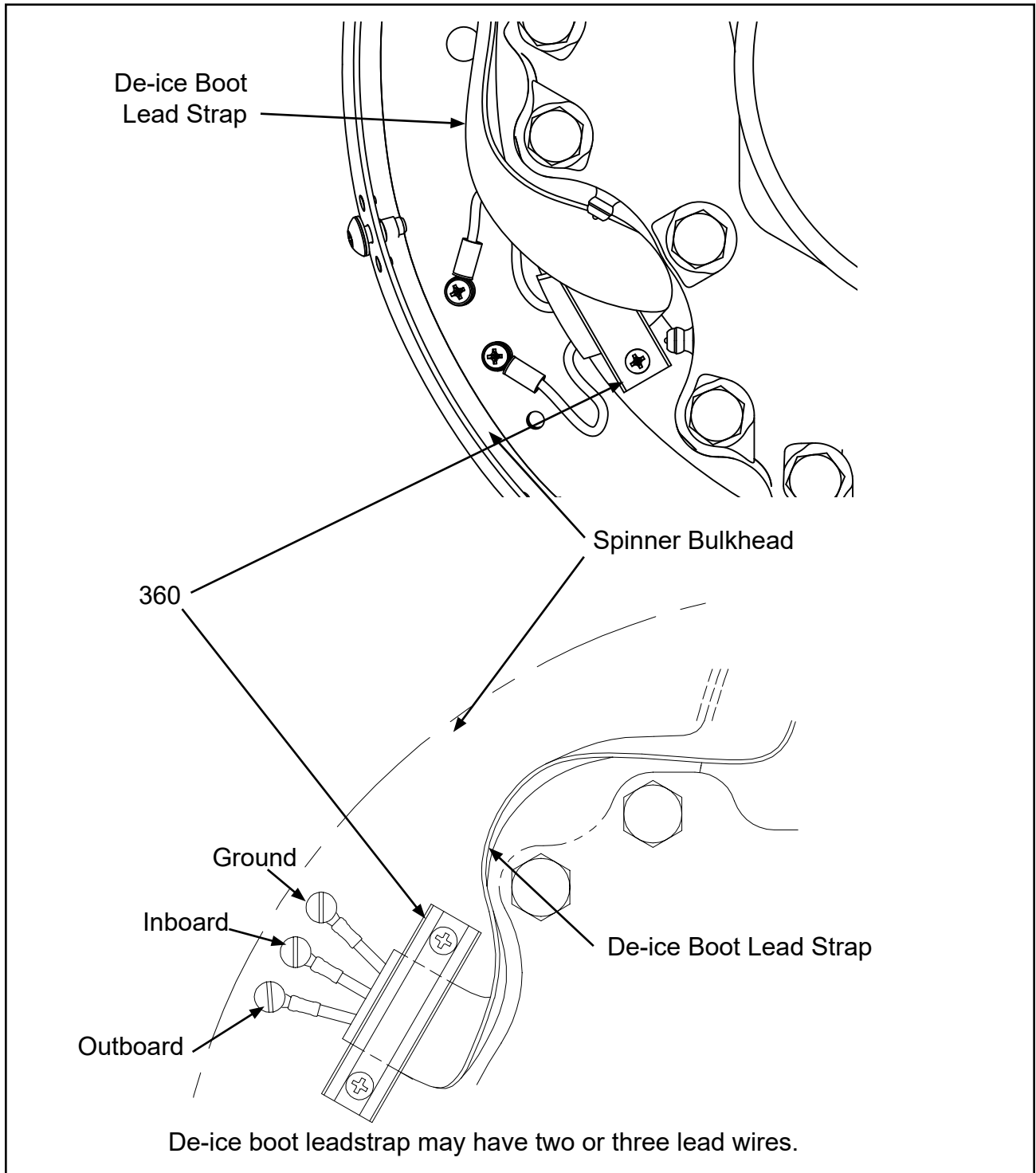
**De-ice Boot Lead Wire/Slip Ring Lead Wire Hardware  
Figure K-1**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-5E5706-1**

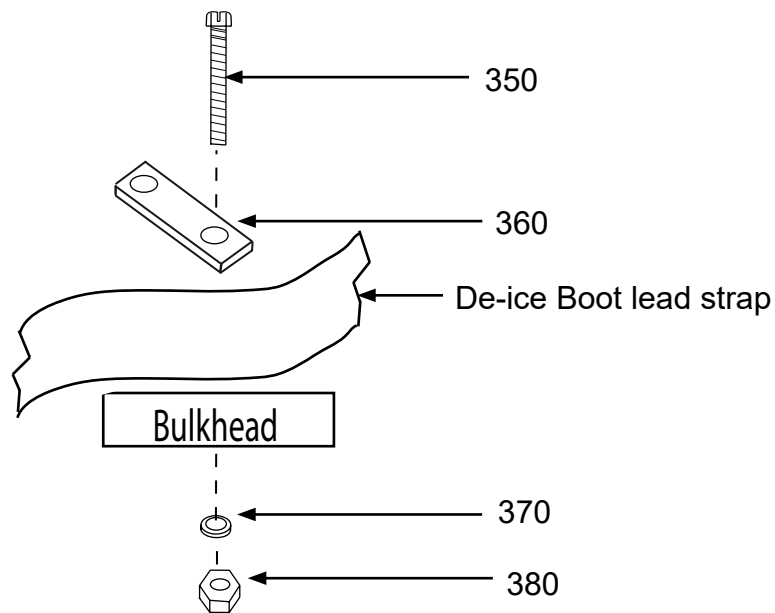


**Lead Clip and De-ice Boot Lead Strap and Lead Wires Attachment to Bulkhead  
Figure K-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-5E5706-1**



**Lead Clip Hardware  
Figure K-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-5E5706-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-5E2706-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11K</b> <b>FIGURES: K-1 thru K-3</b>		
350	B-6637-30	• SCREW, PAN HEAD, CRES.	6	
360	3H1271-2	• CLIP, LEAD STRAP SUPERSEDES ITEM 360A	3	
360A	7931-3E1271-2	• CLIP, LEAD STRAP SUPERSEDED BY ITEM 360	3	
370	B-3837-N632	• WASHER, CORROSION RESISTANT	6	Y
380	B-6655-06	• NUT, HEX, SELF-LOCKING	6	Y
270	B-7035-12	• SCREW, 6-32, PAN HEAD, BRASS	9	
280	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	18	
290	2H1260	• INSULATING BUSHING SUPERSEDES ITEM 290A	18	
290A	7931-2E1260	• INSULATING BUSHING SUPERSEDED BY ITEM 290	18	
300	B-6641-265	• NUT, HEX, BRASS	9	
305	B-6641-265	• NUT, HEX, BRASS	9	

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 7931-5E2706-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E5706-1**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-025-1**

**L.     Installation Instruction 11L**

- (1) Refer to the de-ice kit installation instructions on the following Goodrich Corporation drawing(s):

- (a) 7E1246 Rev. M

- 1 Refer to the following Hartzell Propeller LLC documents for cross-reference information about Goodrich Corporation part numbers:

a The Vendor Cross-Reference chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02)

b Hartzell Propeller Service Letter HC-SL-30-259

c Hartzell Propeller Service Letter HC-SL-30-260

- (2) Alternate Configuration for Terminal Strip Hardware used with Spinner Bulkhead D-3437-1(P)

- (a) The D-3437-1(P) spinner bulkhead incorporates B-7333-120 rivnuts and B-3893-12H screws to attach the terminal strips to the bulkhead.

**CAUTION:     MAKE SURE THE PROPELLER MOUNTING HARDWARE DOES NOT INTERFERE WITH THE RIVNUTS AND SCREWS USED TO ATTACH THE TERMINAL STRIP TO THE BULKHEAD.**

- (b) When installed on the aircraft, aircraft mounted hardware may damage the rivnuts and screws.

- (c) To correct the interference, remove the rivnuts and reattach the terminal strip to the bulkhead in accordance with the following steps:

- 1 Remove the rivnuts using standard maintenance practices.
- 2 Using the screws (125), washers (200), and tapped eyelets (300), attach the terminal strip (400) to the bulkhead in accordance with the Alternate Configuration shown in Figure L-1.
- 3 Torque the screws (125) to 10-12 In-Lb (1.12-1.35 N•m).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-65-025-1**

**L.     Installation Instruction 11L, continued**

- (3) Alternate Configuration for Loop Clamp Hardware used with Spinner Bulkhead D-3437-1(P).

**CAUTION:**     **MAKE SURE THE AIRFRAME MOUNTED HARDWARE  
DOES NOT INTERFERE WITH THE HARDWARE USED TO  
ATTACH THE LOOP CLAMP TO THE BULKHEAD.**

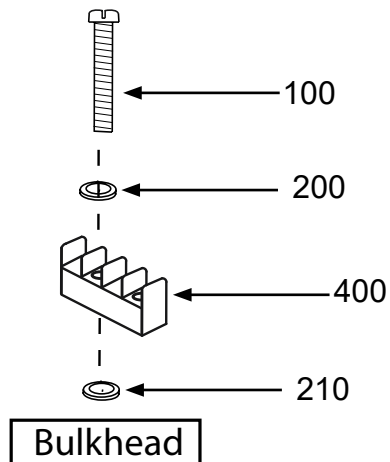
- (a) When installed on the aircraft, aircraft mounted hardware may interfere with hardware used to attach the loop clamp (500) to the bulkhead.
- (b) To correct the interference, remove the loop clamp hardware and reattach the loop clamp (500) to the bulkhead in accordance with the following steps:
  - 1     Remove the loop clamp (500) and attaching hardware from the bulkhead.
  - 2     Using the screw (625), washers (700), and nut (800), attach the loop clamp (500) to the bulkhead in accordance with the Alternate Configuration shown in Figure L-2.
  - 3     Torque the screw (625) to 22-25 In-Lbs. (2.5-2.8 N•m).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

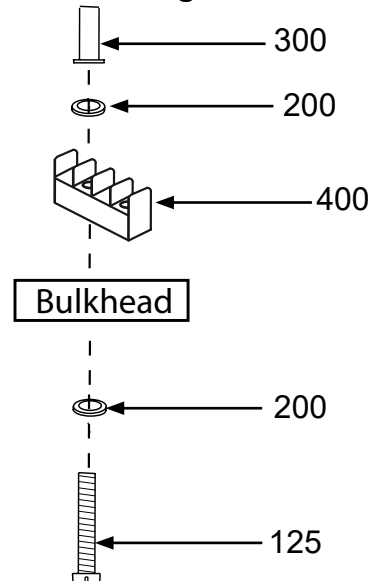
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-65-025-1**

**Standard Configuration**



**Alternate Configuration**



Wire harness attaching hardware  
(included w/terminal strip)

Washer P/N	Screw P/N
B-3854-40	B-6637-13

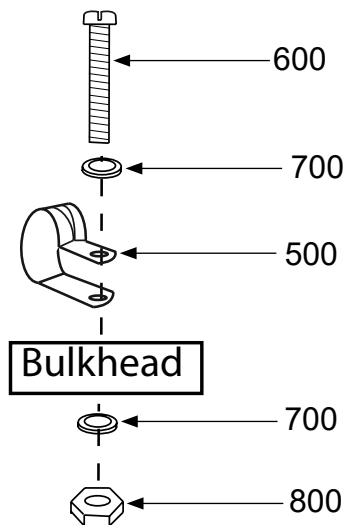
**Terminal Strip Hardware Configurations  
Figure L-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

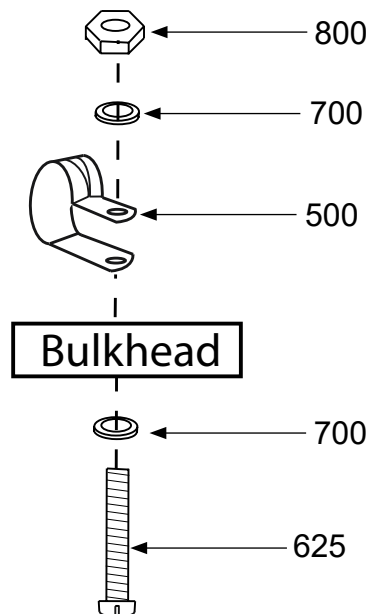
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-65-025-1**

**Standard Configuration**



**Alternate Configuration**



**Loop Clamp Hardware Configurations  
Figure L-2**



# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-025-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-65-025-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11L</b> <b>FIGURES: L-1 THRU L-2</b>		
		<b>TERMINAL STRIP HARDWARE (STANDARD CONFIGURATION)</b>		
100	B-6631-232	• SCREW, 6-32, FILLISTER HEAD, CRES	6	Y
100A	B-3893-12H	• SCREW, 6-32, FILLISTER HEAD, CRES, ALTERNATE	6	Y
200	B-3854-41	• WASHER, LOCK	6	Y
210	B-3837-N632	• WASHER, CORROSION RESISTANT	6	Y
400	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES ITEM 170A	3	
400A	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY ITEM 170	3	
		<b>TERMINAL STRIP HARDWARE (ALTERNATE CONFIGURATION)</b>		
125	B-6637-34	SCREW, PAN HEAD	6	Y
200	B-3854-41	WASHER, LOCK	12	Y
300	2H1365	TAPPED EYELET SUPERSEDES ITEM 190A	6	Y
300A	7931-2E1365	TAPPED EYELET SUPERSEDED BY ITEM 190	6	Y
400	1H1150-2	TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES ITEM 170A	3	
400A	7931-1E1150-2	TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY ITEM 170	3	
		<b>LOOP CLAMP HARDWARE (STANDARD CONFIGURATION)</b>		
500	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	3	Y
600	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	3	Y
700	B-3837-N832	• WASHER, CORROSION RESISTANT	6	Y
800	B-6655-08	• NUT, HEX, SELF-LOCKING	3	Y
		<b>LOOP CLAMP HARDWARE (ALTERNATE CONFIGURATION)</b>		
500	B-3857-WDG4	CLAMP, LOOP, CUSHIONED	3	Y
625	B-6637-34	SCREW, PAN HEAD	3	Y
700	B-3837-N832	WASHER, CORROSION RESISTANT	6	Y
800	B-6655-08	NUT, HEX, SELF-LOCKING	3	Y

- ITEM NOT ILLUSTRATED

Electric De-ice Kit: 7931-65-025-1 (page 1 of 2)

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-65-025-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-65-025-1</b>	<b>PROPELLER DE-ICE KIT (CONTINUED)</b> <b>INSTALLATION INSTRUCTION 11L</b> <b>FIGURES: L-1 THRU L-2</b>		
-	3H1883-2	• ASSEMBLY, TERMINAL CLAMP SUPERSEDES 7931-3E1883-2	3	
-	B-3864-37	• • WASHER, LOCK, INTERNAL TOOTH	3	Y
-	B-6641-265	• • NUT, HEX, BRASS	3	
-	7931-3E1883-2	• ASSEMBLY, TERMINAL CLAMP SUPERSEDED BY 3H1883-2	3	
-	B-3864-38	• WASHER, LOCK, INTERNAL TOOTH	3	Y
-	B-6977-8	• SCREW, 8-32, FILLISTER HEAD	3	Y
-	B-6658-8	• SCREW, 10-32, FILLISTER HEAD	6	Y
-	B-3837-0332	• WASHER, CORROSION RESISTANT	6	Y
-	B-6735	• CLAMP, LOOP, CUSHIONED	3	Y
-	4H1889-2	• DE-ICE WIRE HARNESS SUPERSEDES 7931-4E1889-2	3	Y
-	7931-4E1889-2	• DE-ICE WIRE HARNESS SUPERSEDED BY 4H1889-2	3	Y
-	7931-4E1526-1	• SLIP RING ASSEMBLY USED WITH 7931-4E1689 SUPERSEDED BY 4H1526-1	1	
-	4H1526-1	• SLIP RING ASSEMBLY USED WITH 7931-4E1689 SUPERSEDES 7931-4E1526-1 SUPERSEDED BY 4H1526-4	1	
-	4H1526-4	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E1526-1 AND 7931-4E1689, SUPERSEDES 4H1526-1 AND 7931-4E1689	1	
-	B-3865-13A	• BOLT, 1/4-28, HEX HEAD, CRES	3	Y
-	B-3865-16A	• BOLT, 1/4-28, HEX HEAD, CRES	6	Y
-	B-6655-4	• NUT, HEX, SELF-LOCKING	9	Y
-	B-3837-0432	• WASHER, CORROSION RESISTANT	9	Y
-	7931-4E1689	• DE-ICING SPACER RING, USED WITH 7931-4E1526-1 AND 4H1526-1	1	

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit: 7931-65-025-1 (page 2 of 2)**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-65-035-1**

M. Installation Instruction 11M

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 7E1256 Rev. F

1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)

b Hartzell Propeller Service Letter HC-SL-30-259

c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-035-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-65-035-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11M</b>		
	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-2	3	
	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-2	3	
	B-3854-41	• WASHER, LOCK	6	Y
	B-3893-12H	• SCREW, 6-32, FILLISTER HEAD, CRES	6	
	B-6634-232	• SCREW, 6-32, FILLISTER HEAD, CRES ALTERNATE FOR B-3893-12H	6	
	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	3	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	3	Y
	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	3	Y
	B-3851-N832	• WASHER	3	Y
	B-3851-N832	• WASHER	3	Y
	3H1883-2	• ASSEMBLY, TERMINAL CLAMP SUPERSEDES 7931-3E1883-2	3	
	B-3864-37	• • WASHER, LOCK, INTERNAL TOOTH	3	Y
	B-6641-265	• • NUT, HEX, BRASS	3	
	7931-3E1883-2	• ASSEMBLY, TERMINAL CLAMP SUPERSEDED BY 3H1883-2	3	
	B-3864-38	• WASHER, LOCK, INTERNAL TOOTH	3	
	B-6977-8	• SCREW, 8-32, FILLISTER HEAD	3	
	B-6658-8	• SCREW, 10-32, FILLISTER HEAD	6	
	B-3837-0332	• WASHER, CORROSION RESISTANT	6	Y
	B-6735	• CLAMP, LOOP, CUSHIONED	3	Y
	4H1889-2	• DE-ICE WIRE HARNESS SUPERSEDES 7931-4E1889-2	3	Y
	7931-4E1889-2	• DE-ICE WIRE HARNESS SUPERSEDED BY 4H1889-2	3	Y
	4H1555-1	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E1555-1	1	
	7931-4E1555-1	• SLIP RING ASSEMBLY SUPERSEDED BY 4H1555-1	1	
	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	12	Y
	B-7077-52	• BELLEVILLE SPRING WASHER	12	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	12	Y
	B-3837-0432	• WASHER, CORROSION RESISTANT	12	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit: 7931-65-035-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-65-040-1**

N. Installation Instruction 11N

- (1) Refer to the Goodrich Corporation drawing listed below for installation instructions - except install the terminal strip hardware in accordance with Figure N-1 in this section:

(a) 7E1240 Rev. U

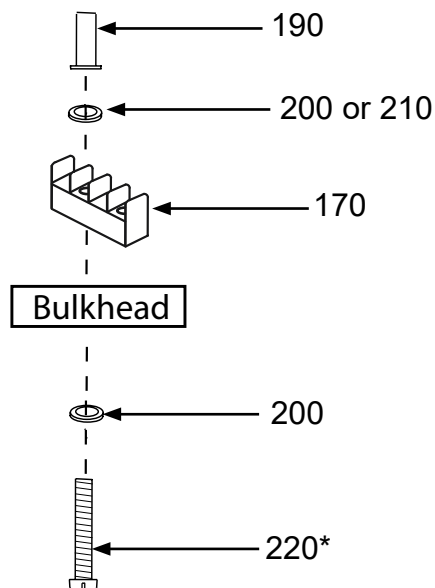
- 1 Refer to the following Hartzell Propeller LLC documents for cross-reference information about Goodrich Corporation part numbers:

- a The Vendor Cross-Reference chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02)
- b Hartzell Propeller Service Letter HC-SL-30-259
- c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-65-040-1**



\* Torque until snug.

**Terminal Strip Hardware Configuration  
Figure N-1**

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

## 7931-65-040-1

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-65-040-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11N FIGURE: N-1</b>		
170	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES ITEM 170A	3	
170A	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY ITEM 170	3	
190	2H1365	• TAPPED EYELET SUPERSEDES ITEM 190A	6	Y
190A	7931-2E1365	• TAPPED EYELET SUPERSEDED BY ITEM 190	6	Y
200	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	6	Y
210	B-3837-N632	• WASHER, CORROSION RESISTANT	6	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES.	6	Y
	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	3	Y
	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	3	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	3	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	6	Y
	3H1883-2	• ASSEMBLY, TERMINAL CLAMP SUPERSEDES 7931-3E1883-2	3	
	B-3864-37	• • WASHER, LOCK, INTERNAL TOOTH	3	Y
	B-6641-265	• • NUT, HEX, BRASS	3	
	7931-3E1883-2	• ASSEMBLY, TERMINAL CLAMP SUPERSEDED BY 3H1883-2	3	
	B-3864-38	• WASHER, LOCK, INTERNAL TOOTH	3	
	B-6977-8	• SCREW, 8-32, FILLISTER HEAD	3	
	B-6658-8	• SCREW, 10-32, FILLISTER HEAD	6	
	B-3837-0332	• WASHER, CORROSION RESISTANT	6	Y
	B-6735	• CLAMP, LOOP, CUSHIONED	3	Y
	7931-4E1889-2	• DE-ICE WIRE HARNESS SUPERSEDED BY 4H1889-2	3	Y
	4H1889-2	• DE-ICE WIRE HARNESS SUPERSEDES 7931-4E1889-2	3	Y
	4H1555-1	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E1555-1	1	
	7931-4E1555-1	• SLIP RING ASSEMBLY SUPERSEDED BY 4H1555-1	1	
	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	12	Y
	B-7077-52	• BELLEVILLE SPRING WASHER	12	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	12	Y
	B-3837-0432	• WASHER, CORROSION RESISTANT	12	Y

- ITEM NOT ILLUSTRATED

## Electric De-ice Kit: 7931-65-040-1

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-040-1**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-085-A(\*1)**

O. Installation Instruction 11O

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 7E1306 Rev. R

- 1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)

b Hartzell Propeller Service Letter HC-SL-30-259

c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-085-A(\*1)**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-65-085-A</b>	<b>PROPELLER DE-ICE KIT, 4E1967-4 INSTALLATION INSTRUCTION 110</b>		
	7931-4E1967-4	• WIRE HARNESS, KIT SUPERSEDED BY 4H1967-4	3	Y
	4H1967-4	• WIRE HARNESS, KIT SUPERSEDES 7931-4E1967-4	3	Y
	B-3852-1-0	• • STRAP, TIEDOWN, PLASTIC	3	Y
	B-3852-2-0	• • STRAP, TIEDOWN, PLASTIC	2	Y
	B-3852-4-0	• • STRAP, TIEDOWN, PLASTIC	1	Y
	108567	• • SPLICE, BUTT	3	
	7931-320562	• • SPLICE, BUTT ALTERNATE FOR 108567	3	
	101902	• • TERMINAL, RING	3	
	7931-320619	• • AMP 320619 PIDG RING TERMINAL ALTERNATE FOR 101902	3	
	7931-2-320619-1	• • AMP 320619 PIDG RING TERMINAL ALTERNATE FOR 101902	3	
	SAE-AMS-I-7444	• • CLEAR VINYL TUBING		

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-65-085-A**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-085-A(\*1)**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-65-085-A*1</b>	<b>PROPELLER DE-ICE KIT, 4E1967-3 INSTALLATION INSTRUCTION 110</b>		
	7931-4E1967-3	• WIRE HARNESS, KIT SUPERSEDED BY 4H1967-3	3	Y
	4H1967-3	• WIRE HARNESS, KIT SUPERSEDES 7931-4E1967-3	3	Y
	B-3852-1-0	• • STRAP, TIEDOWN, PLASTIC	1	Y
	B-3852-2-0	• • STRAP, TIEDOWN, PLASTIC	2	Y
	101902	• • TERMINAL, RING	3	
	7931-320619	• • AMP 320619 PIDG RING TERMINAL ALTERNATE FOR 101902	3	
	7931-2-320619-1	• • AMP 320619 PIDG RING TERMINAL ALTERNATE FOR 101902	3	
	SAE-AMS-I-7444	• • CLEAR VINYL TUBING		

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-65-085-A\*1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-085-A(\*1)**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-090-1 and 7931-65-090-1\***

P. Installation Instruction 11P

(1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

(a) 7E1286 Rev. N

1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)

b Hartzell Propeller Service Letter HC-SL-30-259

c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-090-1 and 7931-65-090-1\***

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-65-090-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)(WITH START LOCKS) INSTALLATION INSTRUCTION 11P</b>		
	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-2	3	
	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-2	3	
	B-3854-41	• WASHER, LOCK	6	Y
	B-6631-232	• SCREW, 6-32, FILLISTER HEAD, CRES	6	Y
	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	3	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	3	Y
	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	3	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	6	Y
	3H1883-2	• ASSEMBLY, TERMINAL CLAMP SUPERSEDES 7931-3E1883-2	3	
	B-3864-37	• • WASHER, LOCK, INTERNAL TOOTH	3	Y
	B-6641-265	• • NUT, HEX, BRASS	3	
	7931-3E1883-2	• ASSEMBLY, TERMINAL CLAMP SUPERSEDED BY 3H1883-2	3	
	B-3864-38	• WASHER, LOCK, INTERNAL TOOTH	3	
	B-3837-0332	• WASHER, CORROSION RESISTANT	6	Y
	B-6977-8	• SCREW, 8-32, FILLISTER HEAD	3	
	B-6658-8	• SCREW, 10-32, FILLISTER HEAD	6	
	B-3840-10	• SCREW (USED WHEN WASHER B-3837-0363 USED AS SPACER)	6	Y
	B-3837-0363	• WASHER	12	Y
	B-6735	• CLAMP, LOOP, CUSHIONED	3	Y
	7931-4E1889-2	• DE-ICE WIRE HARNESS SUPERSEDED BY 4H1889-2	3	Y
	4H1889-2	• DE-ICE WIRE HARNESS SUPERSEDES 7931-4E1889-2	3	Y
	7931-4E1555-1	• SLIP RING ASSEMBLY SUPERSEDED BY 4H1555-1	1	
	4H1555-1	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E1555-1	1	
	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	6	Y
	A-2070-8	• SCREW, 1/4-28, BUTTON HEAD	3	Y
	A-2070-9	• SCREW, 1/4-28, BUTTON HEAD	3	Y
	B-7077-52	• BELLEVILLE SPRING WASHER	12	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	12	Y
	B-3837-0432	• WASHER, CORROSION RESISTANT	12	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-65-090-1**

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-090-1 and 7931-65-090-1\***

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-65-090-1*</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)(WITHOUT START LOCKS) INSTALLATION INSTRUCTION 11P</b>		
	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-2	3	
	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-2	3	
	B-3854-41	• WASHER, LOCK	6	Y
	B-6631-232	• SCREW, 6-32, FILLISTER HEAD, CRES	6	Y
	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	3	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	3	Y
	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	3	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	6	Y
	7931-3E1883-2	• ASSEMBLY, TERMINAL CLAMP SUPERSEDED BY 3H1883-2	3	
	3H1883-2	• ASSEMBLY, TERMINAL CLAMP SUPERSEDES 7931-3E1883-2	3	
	B-3864-37	• • WASHER, LOCK, INTERNAL TOOTH	3	Y
	B-6641-265	• • NUT, HEX, BRASS	3	
	B-3864-38	• WASHER, LOCK, INTERNAL TOOTH	3	
	B-3837-0332	• WASHER, CORROSION RESISTANT	6	Y
	B-6977-8	• SCREW, 8-32, FILLISTER HEAD	3	
	B-6658-8	• SCREW, 10-32, FILLISTER HEAD	6	
	B-3840-10	• SCREW (USED WHEN WASHER B-3837-0363 USED AS SPACER)	6	Y
	B-3837-0363	• WASHER	12	Y
	B-6735	• CLAMP, LOOP, CUSHIONED	3	Y
	7931-4E1889-2	• DE-ICE WIRE HARNESS SUPERSEDED BY 4H1889-2	3	Y
	4H1889-2	• DE-ICE WIRE HARNESS SUPERSEDES 7931-4E1889-2	3	Y
	7931-4E1555-1	• SLIP RING ASSEMBLY SUPERSEDED BY 4H1555-1	1	
	4H1555-1	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E1555-1	1	
	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	12	Y
	B-7077-52	• BELLEVILLE SPRING WASHER	12	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	12	Y
	B-3837-0432	• WASHER, CORROSION RESISTANT	12	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-65-090-1\***

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-090-1 and 7931-65-090-1\***

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-093**

Q. Installation Instruction 11Q

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 7E1284 Rev. G

- 1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)

b Hartzell Propeller Service Letter HC-SL-30-259

c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-65-093**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-65-093</b>	<b>PROPELLER DE-ICE KIT INSTALLATION INSTRUCTION 11Q</b>		
	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-2	3	
	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-2	3	
	B-3854-41	• WASHER, LOCK	6	Y
	B-6631-233	• SCREW, 6-32, FILLISTER HEAD, CRES	6	Y
	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	3	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	3	Y
	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	3	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	6	Y
	3H1883-2	• ASSEMBLY, TERMINAL CLAMP SUPERSEDES 7931-3E1883-2	3	
	B-3864-37	• • WASHER, LOCK, INTERNAL TOOTH	3	Y
	B-6641-265	• • NUT, HEX, BRASS	3	
	7931-3E1883-2	• ASSEMBLY, TERMINAL CLAMP SUPERSEDED BY 3H1883-2	3	
	B-3837-0332	• WASHER, CORROSION RESISTANT	6	Y
	B-6977-8	• SCREW, 8-32, FILLISTER HEAD	3	
	B-6658-8	• SCREW, 10-32, FILLISTER HEAD	6	
	B-3864-38	• WASHER, LOCK, INTERNAL TOOTH	3	
	B-6735	• CLAMP, LOOP, CUSHIONED	3	Y
	4H1889-2	• DE-ICE WIRE HARNESS SUPERSEDES 7931-4E1889-2	3	Y
	7931-4E1889-2	• DE-ICE WIRE HARNESS SUPERSEDED BY 4H1889-2	3	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-65-093**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-100-1(A, B1, B2, BM, BS)**

**R. Installation Instruction 11R**

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

(a) 7E1277 Rev. T

1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)

b Hartzell Propeller Service Letter HC-SL-30-259

c Hartzell Propeller Service Letter HC-SL-30-260

- (2) De-ice Kit 7931-100-1B2 uses:  
7931-65-100-1BM for Synchrophaser Master - and  
7931-65-100-1BS for Synchrophaser Slave applications

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-100-1(A, B1, B2, BM, BS)**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-65-100-1A</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11R</b>		
	3H1883-2	• ASSEMBLY, TERMINAL CLAMP SUPERSEDES 7931-3E1883-2	3	
	B-3864-37	• • WASHER, LOCK, INTERNAL TOOTH	3	Y
	B-6641-265	• • NUT, HEX, BRASS	3	
	7931-3E1883-2	• ASSEMBLY, TERMINAL CLAMP SUPERSEDED BY 3H1883-2	3	
	B-6658-8	• SCREW, 10-32, FILLISTER HEAD	6	
	B-3837-0332	• WASHER, CORROSION RESISTANT	6	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-65-100-1A**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-100-1(A, B1, B2, BM, BS)**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-65-100-1B1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLTION INSTRUCTION 11R</b>		
	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-2	3	
	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-2	3	
	B-3854-41	• WASHER, LOCK	6	Y
	B-6631-233	• SCREW, 6-32, FILLISTER HEAD, CRES	6	Y
	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	3	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	3	Y
	B-6976-10	• SCREW, 8-32, WASHER HEAD	3	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	3	Y
	B-3864-38	• WASHER, LOCK, INTERNAL TOOTH	3	
	B-6977-8	• SCREW, 8-32, FILLISTER HEAD	3	
	B-6735	• CLAMP, LOOP, CUSHIONED	3	Y
	4H1889-2	• DE-ICE WIRE HARNESS SUPERSEDES 7931-4E1889-2	3	Y
	7931-4E1889-2	• DE-ICE WIRE HARNESS SUPERSEDED BY 4H1889-2	3	Y
	4H1555-1	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E1555-1	1	
	7931-4E1555-1	• SLIP RING ASSEMBLY SUPERSEDED BY 4H1555-1	1	
	A-2070-8	• SCREW, 1/4-28, BUTTON HEAD	12	Y
	B-7077-52	• BELLEVILLE SPRING WASHER	24	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	12	Y
	B-3837-0432	• WASHER, CORROSION RESISTANT	12	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-65-100-1B1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-100-1(A, B1, B2, BM, BS)**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	7931-65-100-1B2	PROPELLER DE-ICE KIT (ONE PROP) USE DE-ICE KIT 7931-65-100-1BM FOR SYNCHROPHASER MASTER AND 7931-65-100-1BS FOR SYNCHROPHASER SLAVE APPLICATIONS		

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-65-100-1B2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-100-1(A, B1, B2, BM, BS)**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-65-100-1BM</b>	<b>PROPELLER DE-ICE KIT (LEFT PROP) SYNCRO INSTALLATION INSTRUCTION 11R</b>		
	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-2	3	
	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-2	3	
	B-3854-41	• WASHER, LOCK	6	Y
	B-6631-232	• SCREW, 6-32, FILLISTER HEAD, CRES	6	Y
	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	3	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	3	Y
	B-6976-10	• SCREW, 8-32, WASHER HEAD	3	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	3	Y
	B-3864-38	• WASHER, LOCK, INTERNAL TOOTH	3	
	B-6977-8	• SCREW, 8-32, FILLISTER HEAD	3	
	B-6735	• CLAMP, LOOP, CUSHIONED	3	Y
	4H1889-2	• DE-ICE WIRE HARNESS SUPERSEDES 7931-4E1889-2	3	Y
	7931-4E1889-2	• DE-ICE WIRE HARNESS SUPERSEDED BY 4H1889-2	3	Y
	4H1555-2	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E1555-2	1	
	7931-4E1555-2	• SLIP RING ASSEMBLY SUPERSEDED BY 4H1555-2	1	
	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	12	Y
	B-7077-52	• BELLEVILLE SPRING WASHER	24	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	12	Y
	B-3837-0432	• WASHER, CORROSION RESISTANT	12	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-65-100-1BM**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-100-1(A, B1, B2, BM, BS)**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-65-100-1BS</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) WITH SYNCROPHASER TARGET INSTALLATION INSTRUCTION 11R</b>		
	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-2	3	
	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-2	3	
	B-3854-41	• WASHER, LOCK	6	Y
	B-6631-232	• SCREW, 6-32, FILLISTER HEAD, CRES	6	Y
	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	3	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	3	Y
	B-6976-10	• SCREW, 8-32, WASHER HEAD	3	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	3	Y
	B-3864-38	• WASHER, LOCK, INTERNAL TOOTH	3	
	B-6977-8	• SCREW, 8-32, FILLISTER HEAD	3	
	B-6735	• CLAMP, LOOP, CUSHIONED	3	Y
	4H1889-2	• DE-ICE WIRE HARNESS SUPERSEDES 7931-4E1889-2	3	Y
	7931-4E1889-2	• DE-ICE WIRE HARNESS SUPERSEDED BY 4H1889-2	3	Y
	4H1555-3	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E1555-3	1	
	7931-4E1555-3	• SLIP RING ASSEMBLY SUPERSEDED BY 4H1555-3	1	
	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	12	Y
	B-7077-52	• BELLEVILLE SPRING WASHER	24	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	12	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-65-100-1BS**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-105-1**

S. Installation Instruction 11S

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 7E1310 Rev. F

- 1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

- a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)
- b Hartzell Propeller Service Letter HC-SL-30-259
- c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-65-105-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-65-105-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11S</b>		
	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-2	4	
	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-2	4	
	B-3854-41	• WASHER, LOCK	8	Y
	B-3893-12H	• SCREW, 6-32, FILLISTER HEAD, CRES SUPERSEDED BY B-6631-233	8	Y
	B-6631-233	• SCREW, 6-32, FILLISTER HEAD, CRES SUPERSEDES B-3893-12H	8	Y
	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	4	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	8	Y
	B-6658-8	• SCREW, 10-32, FILLISTER HEAD	4	
	B-3837-N832	• WASHER, CORROSION RESISTANT	8	Y
	7931-3E1848-1	• ASSEMBLY, TERMINAL CLAMP SUPERSEDED BY 3H1848-1	4	
	3H1848-1	• ASSEMBLY, TERMINAL CLAMP SUPERSEDES 7931-3E1848-1	4	
	B-3864-37	• • WASHER, LOCK, INTERNAL TOOTH	3	Y
	B-6641-265	• • NUT, HEX, BRASS	3	
	B-3864-38	• WASHER, LOCK, INTERNAL TOOTH	4	
	B-6977-8	• SCREW, 8-32, FILLISTER HEAD	4	
	B-6658-8	• SCREW, 10-32, FILLISTER HEAD	4	
	B-3837-0332	• WASHER, CORROSION RESISTANT	8	Y
	B-6735	• CLAMP, LOOP, CUSHIONED	4	Y
	7931-4E1889-2	• DE-ICE WIRE HARNESS SUPERSEDED BY 4H1889-2	4	Y
	4H1889-2	• DE-ICE WIRE HARNESS SUPERSEDES 7931-4E1889-2	4	Y
	7931-4E1964-2	• SLIP RING ASSEMBLY SUPERSEDED BY 4H1964-2	1	
	4H1964-2	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E1964-2	1	
	B-3865-13A	• BOLT, 1/4-28, HEX HEAD, CRES	4	
	B-3865-16A	• BOLT, 1/4-28, HEX HEAD, CRES	8	
	B-3851-0432	• WASHER	12	Y
	7931-3E1389-1	• AMMETER, 17-21 AMPS SUPERSEDED BY 3H1389-1	1	
	3H1389-1	• AMMETER, 17-21 AMPS SUPERSEDES 7931-3E1389-1	1	
	3H2042-1	• MODULAR BRUSH BLOCK ASS'Y	1	
	7931-3E2042-1	• MODULAR BRUSH BLOCK ASS'Y ALTERNATE FOR 3H2042-1	1	

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-65-105-1 (page 1 of 2)**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-105-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-65-105-1</b>	<b>PROPELLER DE-ICE KIT (CONTINUED)</b>		
	B-6637-53	• SCREW, PAN HEAD, CRES.	2	
	3H1150-10	• TIMER	1	
	7931-3E1150-10	• TIMER ALTERNATE FOR 3H1150-10	1	
	7931-3E1397-1	• BRACKET, DE-ICE	1	
	1H1157	• SHIM,BRUSH BLOCK ASS'Y	2	
	7931-1E1157	• SHIM,BRUSH BLOCK ASS'Y ALTERNATE FOR 1H1157	2	

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-65-105-1 (page 2 of 2)**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-105-1**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-125-1A and 7931-65-125-1B**

T. Installation Instruction 11T

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 7E1323 Rev. M

- 1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

- a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)
- b Hartzell Propeller Service Letter HC-SL-30-259
- c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-125-1A and 7931-65-125-1B**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-65-125-1A</b>	<b>PROPELLER DE-ICE KIT INSTALLATION INSTRUCTION 11T</b>		
	3H1883-2	• ASSEMBLY, TERMINAL CLAMP SUPERSEDES 7931-3E1883-2	8	
	B-3864-37	• • WASHER, LOCK, INTERNAL TOOTH	3	Y
	B-6641-265	• • NUT, HEX, BRASS	3	
	7931-3E1883-2	• ASSEMBLY, TERMINAL CLAMP SUPERSEDED BY 3H1883-2	8	
	B-3837-0332	• WASHER, CORROSION RESISTANT	16	Y
	B-6658-8	• SCREW, 10-32, FILLISTER HEAD	16	

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-65-125-1A**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-125-1A and 7931-65-125-1B**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-65-125-1B</b>	<b>PROPELLER DE-ICE KIT INSTALLATION INSTRUCTION 11T</b>		
	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-2	4	
	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-2	4	
	B-3854-41	• WASHER, LOCK	8	Y
	B-6631-232	• SCREW, 6-32, FILLISTER HEAD, CRES	8	Y
	B-3893-12H	• SCREW, 6-32, FILLISTER HEAD, CRES (ALTERNATE FOR B-6631-232)	8	Y
	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	4	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
	B-3894-10H	• SCREW, 8-32, FILLISTER HEAD, CRES (ALTERNATE FOR B-3856-246)	4	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	8	Y
	3H1883-2	• ASSEMBLY, TERMINAL CLAMP SUPERSEDES 7931-3E1883-2	4	
	B-3864-37	• • WASHER, LOCK, INTERNAL TOOTH	3	Y
	B-6641-265	• • NUT, HEX, BRASS	3	
	7931-3E1883-2	• ASSEMBLY, TERMINAL CLAMP SUPERSEDED BY 3H1883-2	4	
	B-3864-38	• WASHER, LOCK, INTERNAL TOOTH	4	Y
	B-6977-8	• SCREW, 8-32, FILLISTER HEAD	4	Y
	B-6658-8	• SCREW, 10-32, FILLISTER HEAD	8	Y
	B-3837-0332	• WASHER, CORROSION RESISTANT	8	Y
	B-6735	• CLAMP, LOOP, CUSHIONED	4	Y
	4H1889-2	• DE-ICE WIRE HARNESS SUPERSEDES 7931-4E1889-2	4	Y
	7931-4E1889-2	• DE-ICE WIRE HARNESS SUPERSEDED BY 4H1889-2	4	Y
	4H1933-7	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E1933-7	1	
	7931-4E1933-7	• SLIP RING ASSEMBLY SUPERSEDED BY 4H1933-7	1	
	B-3384-26	• BOLT, 1/4-28, HEX HEAD	8	Y
	B-3865-15A	• BOLT, 1/4-28, HEX HEAD, CRES SUPERSEDED BY 102831	4	Y
	102831	• BOLT, 1/4-28, HEX HEAD, CRES SUPERSEDES B-3865-15A	4	Y
	B-7076-42	• BELLEVILLE SPRING WASHER	36	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	12	Y
	B-3837-0432	• WASHER, CORROSION RESISTANT	9	Y
	B-3837-0463	• WASHER, CORROSION RESISTANT	20	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-65-125-1B**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-125-1A and 7931-65-125-1B**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-155-1**

U.    Installation Instruction 11U

(1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

(a) 7E1335 Rev. M

1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)

b Hartzell Propeller Service Letter HC-SL-30-259

c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-155-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-65-155-1</b>	<b>PROPELLER DE-ICE KIT INSTALLATION INSTRUCTION 11U</b>		
	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-2	3	
	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-2	3	
	B-3854-41	• WASHER, LOCK	6	Y
	B-3837-N632	• WASHER, CORROSION RESISTANT	6	Y
	B-6631-233	• SCREW, 6-32, FILLISTER HEAD, CRES	6	Y
	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	3	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	3	Y
	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	3	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	6	Y
	3H1883-2	• ASSEMBLY, TERMINAL CLAMP SUPERSEDES 7931-3E1883-2	3	
	B-3864-37	• • WASHER, LOCK, INTERNAL TOOTH	3	Y
	B-6641-265	• • NUT, HEX, BRASS	3	
	7931-3E1883-2	• ASSEMBLY, TERMINAL CLAMP SUPERSEDED BY 3H1883-2	3	
	B-3864-38	• WASHER, LOCK, INTERNAL TOOTH	3	
	B-6977-8	• SCREW, 8-32, FILLISTER HEAD	3	
	B-6658-8	• SCREW, 10-32, FILLISTER HEAD	6	
	B-3837-0332	• WASHER, CORROSION RESISTANT	6	Y
	B-6735	• CLAMP, LOOP, CUSHIONED	3	Y
	4H1889-2	• DE-ICE WIRE HARNESS SUPERSEDES 7931-4E1889-2	3	Y
	7931-4E1889-2	• DE-ICE WIRE HARNESS SUPERSEDED BY 4H1889-2	3	Y
	7931-4E1614-3	• SLIP RING ASSEMBLY	1	
	B-3865-16A	• BOLT, 1/4-28, HEX HEAD, CRES	9	
	B-6655-04	• NUT, HEX, SELF-LOCKING	9	
	B-3837-0432	• WASHER, CORROSION RESISTANT	9	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-65-155-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-165-1**

V. Installation Instruction 11V

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 7E1338 Rev. J

- 1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

- a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)
- b Hartzell Propeller Service Letter HC-SL-30-259
- c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-65-165-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-65-165-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11V</b>		
	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-2	4	
	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-2	4	
	B-3854-41	• WASHER, LOCK	8	Y
	B-6631-232	• SCREW, 6-32, FILLISTER HEAD, CRES	8	Y
	B-6735	• CLAMP, LOOP, CUSHIONED	4	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-2	4	
	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-2	4	
	B-6631-231	• SCREW, 6-32, FILLISTER HEAD, CRES	8	Y
	B-3854-41	• WASHER, LOCK	8	
	B-3856-243	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
	B-6735	• CLAMP, LOOP, CUSHIONED	4	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
	4H1889-4	• DE-ICE WIRE HARNESS SUPERSEDES 7931-4E1889-4	4	Y
	7931-4E1889-4	• DE-ICE WIRE HARNESS SUPERSEDED BY 4H1889-4	4	Y
	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	8	Y
	7931-36151	• AMP 36151 PIDG RING TERMINAL SUPERSEDED BY 108318	12	Y
	108318	• TERMINAL, RING SUPERSEDES 7931-36151	12	Y
	4H1964-2	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E1964-2	1	
	7931-4E1964-2	• SLIP RING ASSEMBLY SUPERSEDED BY 4H1964-2	1	
	B-3865-17A	• BOLT, 1/4-28, HEX HEAD, CRES	8	Y
	B-3865-14A	• BOLT, 1/4-28, HEX HEAD, CRES	4	Y
	B-7076-42	• BELLEVILLE SPRING WASHER	36	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	12	Y
	B-3837-0463	• WASHER, CORROSION RESISTANT	20	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-65-165-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-210-1A**

W. Installation Instruction 11W

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 7E1357 Rev. H

- 1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

- a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)
- b Hartzell Propeller Service Letter HC-SL-30-259
- c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-210-1A**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-65-210-1A</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11W</b>		
	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-2	4	
	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-2	4	
	B-3854-41	• WASHER, LOCK	8	Y
	B-6631-232	• SCREW, 6-32, FILLISTER HEAD, CRES	8	Y
	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	4	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
	4H2369-1	• DE-ICE WIRE HARNESS SUPERSEDES 7931-4E2369-1	4	Y
	7931-4E2369-1	• DE-ICE WIRE HARNESS SUPERSEDED BY 4H2369-1	4	Y
	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	8	Y
	7931-4E1964-3	• SLIP RING ASSEMBLY SUPERSEDED BY 4H1964-3	1	
	4H1964-3	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E1964-3	1	
	B-3384-26H	• BOLT, 1/4-28, HEX HEAD	8	Y
	B-3865-15A	• BOLT, 1/4-28, HEX HEAD, CRES SUPERSEDED BY 102831	4	Y
	102831	• BOLT, 1/4-28, HEX HEAD, CRES SUPERSEDES B-3865-15A	4	Y
	B-7076-42	• BELLEVILLE SPRING WASHER	36	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	12	Y
	B-3837-0463	• WASHER, CORROSION RESISTANT	20	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-65-210-1A**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-225(\*1), 7931-65-225-3(\*1)**

X. Installation Instruction 11X

(1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

(a) 7E1366 Rev. F

1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)

b Hartzell Propeller Service Letter HC-SL-30-259

c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-225(\*1), 7931-65-225-3(\*1)**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-65-225</b>	<b>PROPELLER DE-ICE KIT, 4E1967-1 (ONE PROP) INSTALLATION INSTRUCTION 11X</b>		
	B-7035-12	• SCREW, 6-32, PAN HEAD, BRASS	12	
	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	36	Y
	7931-2E1260	• INSULATING BUSHING SUPERSEDED BY 2H1260	24	
	2H1260	• INSULATING BUSHING SUPERSEDES 7931-2E1260	24	
	B-6641-265	• NUT, HEX, BRASS	24	Y
	B-6637-30	• SCREW, PAN HEAD, CRES.	8	
	7931-3E1271-2	• CLIP, LEAD STRAP SUPERSEDED BY 3H1271-2	4	
	3H1271-2	• CLIP, LEAD STRAP SUPERSEDES 7931-3E1271-2	4	
	B-3837-N632	• WASHER, CORROSION RESISTANT	16	Y
	B-6655-06	• NUT, HEX, SELF-LOCKING	8	
	7931-4E1967-1	• WIRE HARNESS, KIT SUPERSEDED BY 4H1967-1	4	Y
	4H1967-1	• WIRE HARNESS, KIT SUPERSEDES 7931-4E1967-1	4	Y
	B-3852-1-0	• • STRAP, TIEDOWN, PLASTIC	1	
	B-3852-2-0	• • STRAP, TIEDOWN, PLASTIC	2	Y
	101902	• • TERMINAL, RING	3	
	7931-320619	• • AMP 320619 PIDG RING TERMINAL ALTERNATE FOR 101902	3	Y
	7931-2-320619-1	• • AMP 320619 PIDG RING TERMINAL ALTERNATE FOR 101902	3	
	108567	• • SPLICE, BUTT	3	
	7931-320562	• • SPLICE, BUTT ALTERNATE FOR 108567	3	
	SAE-AMS-I-7444	• • CLEAR VINYL TUBING		
	7931-3E2035	• WIRE HARNESS, SLIP RING SUPERSEDED BY 3H2035	4	
	3H2035	• WIRE HARNESS, SLIP RING SUPERSEDES 7931-3E2035	4	
	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	1	Y
	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	2	Y
	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	4	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-65-225**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-225(\*1), 7931-65-225-3(\*1)**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-65-225*1</b>	<b>PROPELLER DE-ICE KIT, 4E1967-3 (ONE PROP) INSTALLATION INSTRUCTION 11X</b>		
	B-7035-12	• SCREW, 6-32, PAN HEAD, BRASS	12	
	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	36	Y
	7931-2E1260	• INSULATING BUSHING SUPERSEDED BY 2H1260	24	
	2H1260	• INSULATING BUSHING SUPERSEDES 7931-2E1260	24	
	B-6641-265	• NUT, HEX, BRASS	24	Y
	B-6637-30	• SCREW, PAN HEAD, CRES.	8	
	7931-3E1271-2	• CLIP, LEAD STRAP SUPERSEDED BY 3H1271-2	4	
	3H1271-2	• CLIP, LEAD STRAP SUPERSEDES 7931-3E1271-2	4	
	B-3837-N632	• WASHER, CORROSION RESISTANT	16	Y
	B-6655-06	• NUT, HEX, SELF-LOCKING	8	
	7931-4E1967-3	• WIRE HARNESS, KIT SUPERSEDED BY 4H1967-3	4	Y
	4H1967-3	• WIRE HARNESS, KIT SUPERSEDES 7931-4E1967-3	4	Y
	B-3852-1-0	•• STRAP, TIEDOWN, PLASTIC	1	Y
	B-3852-2-0	•• STRAP, TIEDOWN, PLASTIC	2	Y
	101902	•• TERMINAL, RING	3	
	7931-320619	•• AMP 320619 PIDG RING TERMINAL ALTERNATE FOR 101902	3	Y
	7931-2-320619-1	•• AMP 320619 PIDG RING TERMINAL ALTERNATE FOR 101902	3	
	SAE-AMS-I-7444	•• CLEAR VINYL TUBING		
	7931-3E2035	• WIRE HARNESS, SLIP RING SUPERSEDED BY 3H2035	4	
	3H2035	• WIRE HARNESS, SLIP RING SUPERSEDES 7931-3E2035	4	
	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	1	Y
	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	2	Y
	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	4	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-65-225\*1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-225(\*1), 7931-65-225-3(\*1)**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-65-225-3</b>	<b>PROPELLER DE-ICE KIT, 4E1967-1 (ONE PROP) INSTALLATION INSTRUCTION 11X</b>		
	B-7035-12	• SCREW, 6-32, PAN HEAD, BRASS	12	
	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	36	Y
	7931-2E1260	• INSULATING BUSHING SUPERSEDED BY 2H1260	24	
	2H1260	• INSULATING BUSHING SUPERSEDES 7931-2E1260	24	
	B-6641-265	• NUT, HEX, BRASS	24	Y
	B-6637-30	• SCREW, PAN HEAD, CRES.	8	
	7931-3E1271-2	• CLIP, LEAD STRAP SUPERSEDED BY 3H1271-2	4	
	3H1271-2	• CLIP, LEAD STRAP SUPERSEDES 7931-3E1271-2	4	
	B-3837-N632	• WASHER, CORROSION RESISTANT	16	Y
	B-6655-06	• NUT, HEX, SELF-LOCKING	8	Y
	7931-4E1967-1	• WIRE HARNESS, KIT SUPERSEDED BY 4H1967-1	4	Y
	4H1967-1	• WIRE HARNESS, KIT SUPERSEDES 7931-4E1967-1	4	Y
	B-3852-1-0	• • STRAP, TIEDOWN, PLASTIC	1	Y
	B-3852-2-0	• • STRAP, TIEDOWN, PLASTIC	2	Y
	101902	• • TERMINAL, RING	3	
	7931-320619	• • AMP 320619 PIDG RING TERMINAL ALTERNATE FOR 101902	3	Y
	7931-2-320619-1	• • AMP 320619 PIDG RING TERMINAL ALTERNATE FOR 101902	3	
	108567	• • SPLICE, BUTT	3	
	7931-320562	• • SPLICE, BUTT ALTERNATE FOR 108567	3	
	SAE-AMS-I-7444	• • CLEAR VINYL TUBING		
	7931-3E2035	• WIRE HARNESS, SLIP RING SUPERSEDED BY 3H2035	4	
	3H2035	• WIRE HARNESS, SLIP RING SUPERSEDES 7931-3E2035	4	
	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	1	Y
	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	2	Y
	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	4	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-65-225-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-225(\*1), 7931-65-225-3(\*1)**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-65-225-3*1</b>	<b>PROPELLER DE-ICE KIT, 4H1967-3 (ONE PROP) INSTALLATION INSTRUCTION 11X</b>		
	B-7035-12	• SCREW, 6-32, PAN HEAD, BRASS	12	
	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	36	Y
	7931-2E1260	• INSULATING BUSHING SUPERSEDED BY 2H1260	24	
	2H1260	• INSULATING BUSHING SUPERSEDES 7931-2E1260	24	
	B-6641-265	• NUT, HEX, BRASS	24	Y
	B-6637-30	• SCREW, PAN HEAD, CRES.	8	
	7931-3E1271-2	• CLIP, LEAD STRAP SUPERSEDED BY 3H1271-2	4	
	3H1271-2	• CLIP, LEAD STRAP SUPERSEDES 7931-3E1271-2	4	
	B-3837-N632	• WASHER, CORROSION RESISTANT	16	Y
	B-6655-06	• NUT, HEX, SELF-LOCKING	8	Y
	7931-4E1967-1	• WIRE HARNESS, KIT SUPERSEDED BY 4H1967-1	4	Y
	4H1967-1	• WIRE HARNESS, KIT SUPERSEDES 7931-4E1967-1	4	Y
	B-3852-1-0	• • STRAP, TIEDOWN, PLASTIC	1	Y
	B-3852-2-0	• • STRAP, TIEDOWN, PLASTIC	2	Y
	101902	• • TERMINAL, RING	3	
	7931-320619	• • AMP 320619 PIDG RING TERMINAL ALTERNATE FOR 101902	3	Y
	7931-2-320619-1	• • AMP 320619 PIDG RING TERMINAL ALTERNATE FOR 101902	3	
	SAE-AMS-I-7444	• • CLEAR VINYL TUBING		
	7931-3E2035	• WIRE HARNESS, SLIP RING SUPERSEDED BY 3H2035	4	
	3H2035	• WIRE HARNESS, SLIP RING SUPERSEDES 7931-3E2035	4	
	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	1	Y
	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	2	Y
	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	4	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-65-225-3\*1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-225(\*1), 7931-65-225-3(\*1)**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-280-1**

Y. Installation Instruction 11Y

(1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

(a) 7E1428 Rev. D

1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)

b Hartzell Propeller Service Letter HC-SL-30-259

c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-280-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-65-280-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11Y</b>		
	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-2	3	
	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-2	3	
	B-3854-41	• WASHER, LOCK	6	Y
	B-3893-12H	• SCREW, 6-32, FILLISTER HEAD, CRES	6	
	B-6634-232	• SCREW, 6-32, FILLISTER HEAD, CRES (ALTERNATE FOR B-3893-12H)	6	
	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	3	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	3	Y
	B-6976-10	• SCREW, 8-32, WASHER HEAD	3	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	3	Y
	3H1883-2	• ASSEMBLY, TERMINAL CLAMP SUPERSEDES 7931-3E1883-2	3	
	B-3864-37	• • WASHER, LOCK, INTERNAL TOOTH	3	Y
	B-6641-265	• • NUT, HEX, BRASS	3	
	7931-3E1883-2	• ASSEMBLY, TERMINAL CLAMP SUPERSEDED BY 3H1883-2	3	
	B-3864-38	• WASHER, LOCK, INTERNAL TOOTH	3	
	B-6977-8	• SCREW, 8-32, FILLISTER HEAD	3	
	B-6658-8	• SCREW, 10-32, FILLISTER HEAD	6	
	B-3837-0332	• WASHER, CORROSION RESISTANT	6	Y
	B-6735	• CLAMP, LOOP, CUSHIONED	3	Y
	7931-4E1889-7	• DE-ICER WIRE HARNESS ASSEMBLY	3	Y
	4H1555-1	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E1555-1	1	
	7931-4E1555-1	• SLIP RING ASSEMBLY SUPERSEDED BY 4H1555-1	1	
	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	12	Y
	B-7077-52	• BELLEVILLE SPRING WASHER	12	Y
	B-3814	• NUT, 1/4-28, HEX, SELF-LOCKING	12	
	B-3837-0432	• WASHER, CORROSION RESISTANT	12	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-65-280-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-410-1**

**Z.     Installation Instruction 11Z**

(1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

(a) 7E1490 Rev. A

**1**     Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

**a**     The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)

**b**     Hartzell Propeller Service Letter HC-SL-30-259

**c**     Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-65-410-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-65-410-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11Z</b>		
	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-2	3	
	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-2	3	
	B-3854-41	• WASHER, LOCK	6	Y
	B-3893-12H	• SCREW, 6-32, FILLISTER HEAD, CRES	6	
	3H1271-1	• CLIP, LEAD STRAP SUPERSEDES 7931-3E1271-1	3	
	7931-3E1271-1	• CLIP, LEAD STRAP SUPERSEDED BY 3H1271-1	3	
	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	3	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	3	Y
	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	3	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	6	Y
	7931-4E2333-1	• WIRE HARNESS SUPERSEDED BY 105235	3	Y
	105235	• WIRE HARNESS SUPERSEDES 7931-4E2333-1	3	Y
	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	9	Y
	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	6	Y
	7931-4E1526-4	• SLIP RING ASSEMBLY SUPERSEDED BY 4H1526-4	1	
	4H1526-4	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E1526-4	1	
	B-3865-13A	• BOLT, 1/4-28, HEX HEAD, CRES	3	
	B-3865-16A	• BOLT, 1/4-28, HEX HEAD, CRES	6	
	B-6655-04	• NUT, HEX, SELF-LOCKING	9	
	B-3837-0432	• WASHER, CORROSION RESISTANT	9	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-65-410-1**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-65-420-1**

AA. Installation Instruction 11AA

- (1) Refer to the de-ice kit installation instructions on the following  
Ram Corporation drawing(s):

- (a) 34027 Rev. M

- 1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Ram Corporation part numbers:
  - a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)
  - b Hartzell Propeller Service Letter HC-SL-30-259
  - c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-420-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-65-420-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11AA</b>		
	B-7035-12	• SCREW, 6-32, PAN HEAD, BRASS	9	
	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	27	Y
	7931-2E1260	• INSULATING BUSHING SUPERSEDED BY 2H1260	18	
	2H1260	• INSULATING BUSHING SUPERSEDES 7931-2E1260	18	
	B-6641-265	• NUT, HEX, BRASS	9	Y
	B-6637-30	• SCREW, PAN HEAD, CRES.	6	
	B-3837-N632	• WASHER, CORROSION RESISTANT	6	Y
	B-6655-06	• NUT, HEX, SELF-LOCKING	6	Y
	7931-4E1967-3	• WIRE HARNESS, KIT SUPERSEDED BY 4H1967-3	3	Y
	4H1967-3	• WIRE HARNESS, KIT SUPERSEDES 7931-4E1967-3	3	Y
	B-3852-1-0	• • STRAP, TIEDOWN, PLASTIC	1	Y
	B-3852-2-0	• • STRAP, TIEDOWN, PLASTIC	2	Y
	101902	• • TERMINAL, RIING	3	
	7931-320619	• • AMP 320619 PIDG RING TERMINAL ALTERNATE FOR 101902	3	
	7931-2-320619-1	• • AMP 320619 PIDG RING TERMINAL ALTERNATE FOR 101902	3	
	108567	• • SPLICE, BUTT	3	
	7931-320562	• • SPLICE, BUTT ALTERNATE FOR 108567	3	
	SAE-AMS-I-7444	• • CLEAR VINYL TUBING		

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-65-420-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-65-445-1**

**AB. Installation Instruction 11AB**

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 7E1499 Rev. J

- 1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

- a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)
- b Hartzell Propeller Service Letter HC-SL-30-259
- c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-445-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-65-445-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTINO 11AB</b>		
	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-2	4	
	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-2	4	
	B-6631-232	• SCREW, 6-32, FILLISTER HEAD, CRES	8	Y
	B-3854-41	• WASHER, LOCK	8	Y
	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	4	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
	B-6976-10	• SCREW, 8-32, WASHER HEAD	4	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
	3H1883-2	• ASSEMBLY, TERMINAL CLAMP SUPERSEDES 7931-3E1883-2	4	
	B-3864-37	• • WASHER, LOCK, INTERNAL TOOTH	3	Y
	B-6641-265	• • NUT, HEX, BRASS	3	
	7931-3E1883-2	• ASSEMBLY, TERMINAL CLAMP SUPERSEDED BY 3H1883-2	4	
	B-3864-38	• WASHER, LOCK, INTERNAL TOOTH	4	
	B-6977-8	• SCREW, 8-32, FILLISTER HEAD	4	
	B-6658-8	• SCREW, 10-32, FILLISTER HEAD	8	
	B-3837-0332	• WASHER, CORROSION RESISTANT	8	Y
	B-6735	• CLAMP, LOOP, CUSHIONED	4	Y
	4H1889-3	• DE-ICE WIRE HARNESS SUPERSEDES 7931-4E1889-3	4	Y
	7931-4E1889-3	• DE-ICE WIRE HARNESS SUPERSEDED BY 4H1889-3	4	Y
	7931-4E1676-2	• SLIP RING ASSEMBLY	1	
	2H1377	• SYNCHROPHASER TARGET SUPERSEDES 7931-2H1377	4	
	7931-2H1377	• SYNCHROPHASER TARGET SUPERSEDED BY 2H1377	4	
	A-2070-10	• SCREW, 1/4-28, BUTTON HEAD	12	Y
	B-7077-52	• BELLEVILLE SPRING WASHER	24	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	12	Y
	B-3837-0432	• WASHER, CORROSION RESISTANT	12	Y
	B-3855-33	• WASHER, LOCK, EXTERNAL TOOTH	12	

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-65-445-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-470-1 and 7931-65-470-3**

AC. Installation Instruction 11AC

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 7E1534 Rev. G

- 1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)

b Hartzell Propeller Service Letter HC-SL-30-259

c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-470-1 and 7931-65-470-3**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-65-470-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11AC</b>		
	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-2	4	
	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-2	4	
	B-3854-41	• WASHER, LOCK	8	Y
	B-6631-232	• SCREW, 6-32, FILLISTER HEAD, CRES	8	Y
	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	4	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
	4H2369-1	• DE-ICE WIRE HARNESS SUPERSEDES 7931-4E2369-1	4	Y
	7931-4E2369-1	• DE-ICE WIRE HARNESS SUPERSEDED BY 4H2369-1	4	Y
	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	8	Y
	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	8	Y
	4H1964-4	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E1964-4	1	
	7931-4E1964-4	• SLIP RING ASSEMBLY SUPERSEDED BY 4H1964-4	1	
	B-3384-25H	• BOLT, 1/4-28, HEX HEAD, CRES	8	Y
	B-3865-15A	• BOLT, 1/4-28, HEX HEAD, CRES SUPERSEDED BY 102831	4	Y
	102831	• BOLT, 1/4-28, HEX HEAD, CRES SUPERSEDES B-3865-15A	4	Y
	B-7076-42	• BELLEVILLE SPRING WASHER	36	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	12	Y
	B-3837-0432	• WASHER, CORROSION RESISTANT	20	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-65-470-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-470-1 and 7931-65-470-3**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-65-470-3</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11AC</b>		
	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-2	4	
	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-2	4	
	B-3854-41	• WASHER, LOCK	8	Y
	B-6631-232	• SCREW, 6-32, FILLISTER HEAD, CRES	8	Y
	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	4	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
	4H2369-1	• DE-ICE WIRE HARNESS SUPERSEDES 7931-4E2369-1	4	Y
	7931-4E2369-1	• DE-ICE WIRE HARNESS SUPERSEDED BY 4H2369-1	4	Y
	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	8	Y
	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	8	Y
	4H1964-4	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E1964-4	1	
	7931-4E1964-4	• SLIP RING ASSEMBLY SUPERSEDED BY 4H1964-4	1	
	B-3384-25H	• BOLT, 1/4-28, HEX HEAD, CRES	8	Y
	B-3865-15A	• BOLT, 1/4-28, HEX HEAD, CRES SUPERSEDED BY 102831	4	Y
	102831	• BOLT, 1/4-28, HEX HEAD, CRES SUPERSEDES B-3865-15A	4	Y
	B-7076-42	• BELLEVILLE SPRING WASHER	36	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	12	Y
	B-3837-0432	• WASHER, CORROSION RESISTANT	20	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-65-470-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-470-1 and 7931-65-470-3**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-530-1**

AD. Installation Instruction 11AD

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 7E1601 Rev. C

- 1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

- a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)
- b Hartzell Propeller Service Letter HC-SL-30-259
- c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-530-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-65-530-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11AD</b>		
	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-2	3	
	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-2	3	
	B-6631-233	• SCREW, 6-32, FILLISTER HEAD, CRES	6	Y
	B-3854-41	• WASHER, LOCK	6	Y
	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	3	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	3	Y
	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	3	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	3	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	3	Y
	7931-3E1883-2	• ASSEMBLY, TERMINAL CLAMP SUPERSEDED BY 3H1883-2	3	
	3H1883-2	• ASSEMBLY, TERMINAL CLAMP SUPERSEDES 7931-3E1883-2	3	
	B-3864-37	• • WASHER, LOCK, INTERNAL TOOTH	3	Y
	B-6641-265	• • NUT, HEX, BRASS 3		
	B-3864-38	• WASHER, LOCK, INTERNAL TOOTH	3	
	B-6977-8	• SCREW, 8-32, FILLISTER HEAD	3	
	B-6658-8	• SCREW, 10-32, FILLISTER HEAD	6	
	B-3840-10	• SCREW, 10-32, FILLISTER HEAD (ALTERNATE FOR B-6658-8)	6	
	B-3837-0332	• WASHER, CORROSION RESISTANT	6	Y
	B-3837-0363	• WASHER, CORROSION RESISTANT	6	Y
	B-6735	• CLAMP, LOOP, CUSHIONED	3	Y
	4H1889-2	• DE-ICE WIRE HARNESS SUPERSEDES 7931-4E1889-2	3	Y
	7931-4E1889-2	• DE-ICE WIRE HARNESS SUPERSEDED BY 4H1889-2	3	Y
	4H1555-1	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E1555-1	1	
	7931-4E1555-1	• SLIP RING ASSEMBLY SUPERSEDED BY 4H1555-1	1	
	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	12	Y
	B-7077-52	• BELLEVILLE SPRING WASHER	12	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	12	Y
	B-3837-0432	• WASHER, CORROSION RESISTANT	12	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-65-530-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-550-(1,3,5)**

**AE.**    Installation Instruction 11AE

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 7E1633 Rev. K

- 1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)

b Hartzell Propeller Service Letter HC-SL-30-259

c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-550-(1,3,5)**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-65-550-1</b>	<b>PROPELLER DE-ICE KIT INSTALLATION INSTRUCTION 11AE</b>		
	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	6	
	B-6655-08	• NUT, HEX, SELF-LOCKING	6	Y
	B-3856-247	• SCREW, 8-32, FILLISTER HEAD, CRES	6	Y
	B-3854-42	• WASHER, LOCK	12	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	6	Y
	B-3856-243	• SCREW, 8-32, FILLISTER HEAD, CRES	6	Y
	B-3857-WDG5	• CLAMP, LOOP, CUSHIONED	6	
	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	12	Y
	3H2370-4	• WIRE HARNESS SUPERSEDES 7931-3E2370-4	6	Y
	7931-3E2370-4	• WIRE HARNESS SUPERSEDED BY 3H2370-4	6	Y
	7931-3E2475-1	• WIRE HARNESS SUPERSEDED BY 3H2370-4	6	Y
	7931-3E2475-2	• WIRE HARNESS SUPERSEDED BY 3H2370-4	6	Y
	B-3855-32	• WASHER LOCK, EXTERNAL TOOTH	12	Y
	B-6632-04	• BOLT, 10-32, HEX HEAD	12	Y
	7931-3E2369	• BRACKET, WIRE HARNESS	6	
	B-6735	• CLAMP, LOOP, CUSHIONED	12	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-65-550-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-550-(1,3,5)**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-65-550-3</b>	<b>PROPELLER DE-ICE KIT INSTALLATION INSTRUCTION 11AE</b>		
	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-3	6	
	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-3	6	
	B-6655-06	• NUT, HEX, SELF-LOCKING	12	Y
	B-3855-32	• WASHER LOCK, EXTERNAL TOOTH	12	Y
	B-3837-N632	• WASHER, CORROSION RESISTANT	12	Y
	B-6631-233	• SCREW, 6-32, FILLISTER HEAD, CRES	12	Y
	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	6	
	B-6655-08	• NUT, HEX, SELF-LOCKING	6	Y
	B-3856-247	• SCREW, 8-32, FILLISTER HEAD, CRES	6	Y
	B-3854-42	• WASHER, LOCK	6	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	6	Y
	B-3856-243	• SCREW, 8-32, FILLISTER HEAD, CRES	12	Y
	B-3854-42	• WASHER, LOCK	6	Y
	B-3857-WDG5	• CLAMP, LOOP, CUSHIONED	6	Y
	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	12	Y
	7931-3E2370-4	• WIRE HARNESS SUPERSEDED BY 3H2370-4	6	Y
	3H2370-4	• WIRE HARNESS SUPERSEDES 7931-3E2370-4	6	Y
	B-3854-41	• WASHER, LOCK	12	Y
	B-6632-04	• BOLT, 10-32, HEX HEAD	12	Y
	7931-3E2369	• BRACKET, WIRE HARNESS	6	

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-65-550-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-550-(1,3,5)**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-65-550-5</b>	<b>PROPELLER DE-ICE KIT INSTALLATION INSTRUCTION 11AE</b>		
	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-3	6	
	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-3	6	
	B-6655-06	• NUT, HEX, SELF-LOCKING	12	Y
	B-3855-32	• WASHER LOCK, EXTERNAL TOOTH	12	Y
	B-3837-N632	• WASHER, CORROSION RESISTANT	12	Y
	B-6631-233	• SCREW, 6-32, FILLISTER HEAD, CRES	12	Y
	B-3856-243	• SCREW, 8-32, FILLISTER HEAD, CRES	6	Y
	B-3854-42	• WASHER, LOCK	6	Y
	B-3857-WDG5	• CLAMP, LOOP, CUSHIONED	12	
	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	12	Y
	7931-3E2475-1	• DE-ICE WIRE HARNESS SUPERSEDED BY 3H2370-4	6	Y
	3H2370-4	• DE-ICE WIRE HARNESS SUPERSEDES 7931-3E2475-1	6	Y
	B-3854-41	• WASHER, LOCK	12	Y
	B-6632-04	• BOLT, 10-32, HEX HEAD	12	Y
	7931-3E2369	• BRACKET, WIRE HARNESS	6	

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 7931-65-550-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-595-1**

AF. Installation Instruction 11AF

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 7E1779 Rev. D

- 1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

- a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)
- b Hartzell Propeller Service Letter HC-SL-30-259
- c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-65-595-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-65-595-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11AF</b>		
	B-7035-12	• SCREW, 6-32, PAN HEAD, BRASS	9	
	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	27	Y
	7931-2E1260	• INSULATING BUSHING SUPERSEDED BY 2H1260	18	
	2H1260	• INSULATING BUSHING SUPERSEDES 7931-2E1260	18	
	B-6641-265	• NUT, HEX, BRASS	18	Y
	B-6637-30	• SCREW, PAN HEAD, CRES.	6	
	7931-3E1271-2	• CLIP, LEAD STRAP SUPERSEDED BY 3H1271-2	3	
	3H1271-2	• CLIP, LEAD STRAP SUPERSEDES 7931-3E1271-2	3	
	B-3837-N632	• WASHER, CORROSION RESISTANT	6	Y
	B-6655-06	• NUT, HEX, SELF-LOCKING	6	Y
	7931-4E1967-3	• WIRE HARNESS SUPERSEDED BY 4H1967-3	3	Y
	4H1967-3	• WIRE HARNESS SUPERSEDES 7931-4E1967-3	3	Y
	B-3852-1-0	• • STRAP, TIEDOWN, PLASTIC	1	Y
	B-3852-2-0	• • STRAP, TIEDOWN, PLASTIC	2	Y
	101902	• • TERMINAL, RING	3	
	7931-320619	• • AMP 320619 PIDG RING TERMINAL ALTERNATE FOR 101902	3	
	7931-2-320619-1	• • AMP 320619 PIDG RING TERMINAL ALTERNATE FOR 101902	3	
	SAE-AMS-I-7444	• • CLEAR VINYL TUBING		
	7931-4E1881	• SPLIT MOUNTING PLATE SUPERSEDED BY 4H3153	2	
	4H3153	• SPLIT MOUNTING PLATE SUPERSEDES 7931-4E1881	2	
	7931-4E1924-3	• SLIP RING ASSEMBLY SUPERSEDED BY 4H1924-3	1	
	4H1924-3	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E1924-3	1	
	B-3384-6H	• BOLT, 1/4-28, HEX HEAD	6	Y
	B-7077-52	• BELLEVILLE SPRING WASHER	6	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	6	Y
	B-3837-0432	• WASHER, CORROSION RESISTANT USED WITH 4H3153 ONLY	6	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-65-595-1**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-65-600-1**

**AG. Installation Instruction 11AG**

- (1) Position the propeller blades at low blade angle or start lock angle.
- (2) Route the terminal end of the wire harness (890) through the hole in counterweight, as shown in Figure AG-1.
- (3) Assemble the plug connection between the wire harness (890) and the de-ice boot.
- (4) Install and tighten the tie strap (900) around the wire harness/de-ice boot plug connection.
- (5) Position the tie strap head (900) in the approximate location shown in Figure AG-1.
- (6) Install the clear vinyl tubing over the wire harness (890) until the clear vinyl tubing contacts the heat shrink tubing installed on the wire harness (890).
- (7) Install the AMP terminals (975) on the lead wires in accordance with the manufacturer's instructions.
- (8) Secure the wire harness/boot connection to the counterweight.
  - (a) Outboard Tie Strap (910) installation:
    - 1 Install tie straps (910) under the tie strap (900) connecting the wire harness/boot plugs, around the counterweight, and over the wire harness (890) as shown in Figure AG-1.
    - 2 Position the tie strap head in the approximate location shown on the side of the counterweight as shown in Figure AG-1. Do not tighten the tie strap (910) at this time.
  - (b) Inboard Tie Strap (910) installation:
    - 1 Install tie straps (910) under the tie strap (900) connecting the wire harness/boot plugs, around the counterweight, and under the wire harness (890) as shown in Figure AG-1.
    - 2 Position the tie strap head in the approximate location shown on the side of the counterweight as shown in Figure AG-1. Do not tighten the tie strap (910) at this time.
  - (c) Verify the wire harness (890) is taut through the counterweight hole.
  - (d) Tighten all of the tie straps (900 and 910).
- (9) Put the slip ring assembly (1140) on the engine flange.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-65-600-1**

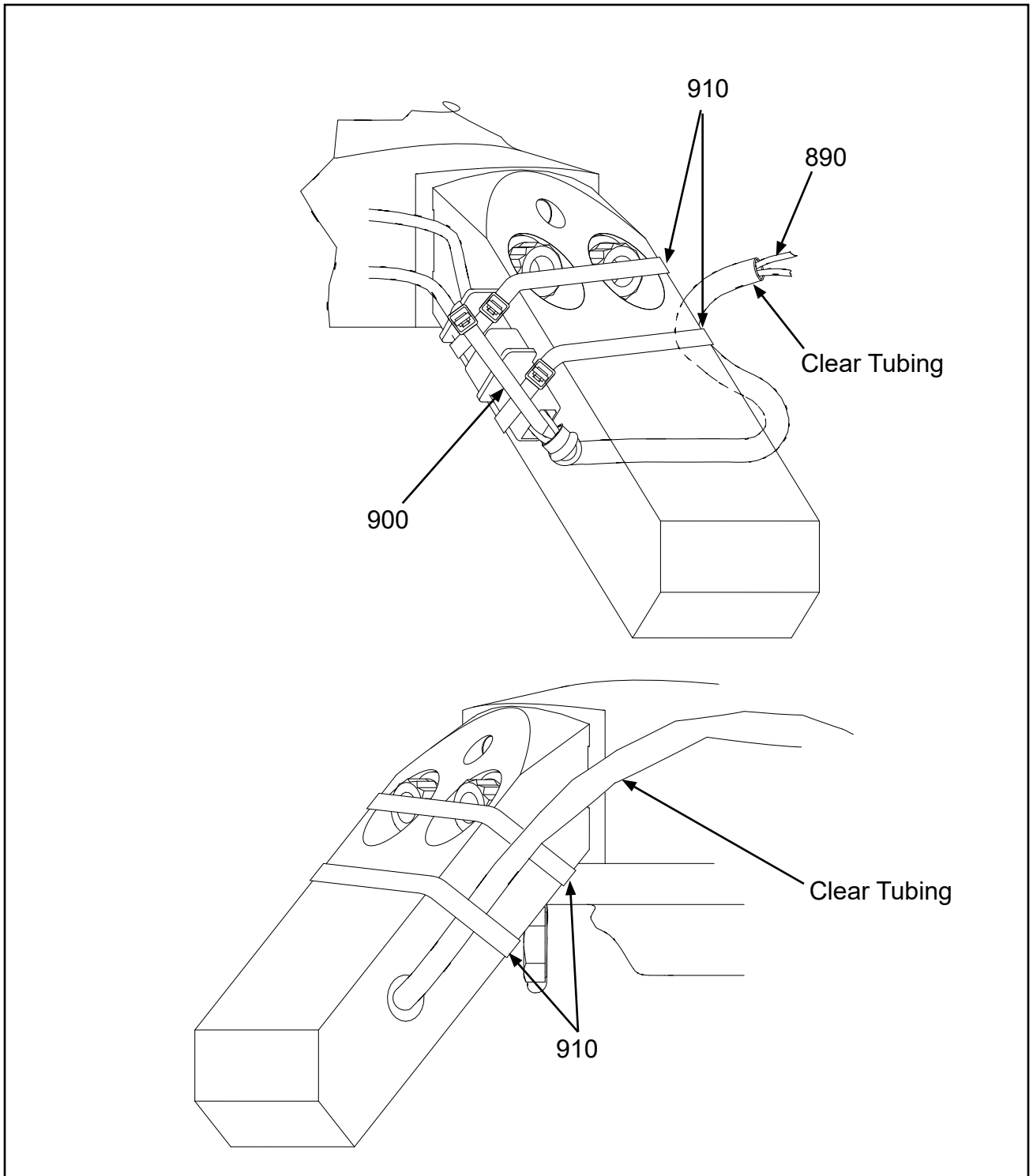
**AG. Installation Instruction 11AG - continued**

- (10) Using the bolt (1160), if applicable, the belleville spring washer (1180), the nut (1190) and the washer (1210), attach the slip ring assembly (1140) to the split mounting plate (1130) in accordance with Figure AG-2.
- (11) Snug the nut, do not torque at this time.
- (12) Install the propeller on the engine flange in accordance with Hartzell Propeller Owner's Manual 115N (61-00-15).
- (13) Using the existing propeller mounting nuts and washers, attach the split mounting plate (1130) to the propeller studs extending through the engine flange in accordance with Figure AG-2.
  - (a) The split between the split mounting plates (1130) must be aligned with the propeller dowel pins.
  - (b) Torque the mounting nuts in accordance with Hartzell Propeller Owner's Manual 115N (61-00-15).
- (14) Torque the bolts (1350) or nuts (1190), as applicable, attaching the slip ring assembly (1140) to the split mounting plates (1130) to 40 - 120 in-lbs. (4.5 - 14 N•m).
- (15) Perform the slip ring (1140) run-out check in accordance with the Check chapter of this manual.
- (16) Using the lead clip (360), screw (350), washer (370) and nut (380), route the de-ice wire harness (890), as shown, and attach to the bulkhead in accordance with Figure AG-3 and Figure AG-4. Tighten the nut (380) until snug.
- (17) Using the screw (270), washer (280), insulating bushings (290), and nut (300 and/or 305), connect the de-ice wire harness (890) and the slip ring lead wires to the bulkhead in accordance with Figure AG-5.
- (18) Torque the nut (300) to 6-8 in. lbs. (0.6-0.9 N•m) and nut (305) 10-12 in. lbs. (1.1-1.3 N•m).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-65-600-1**

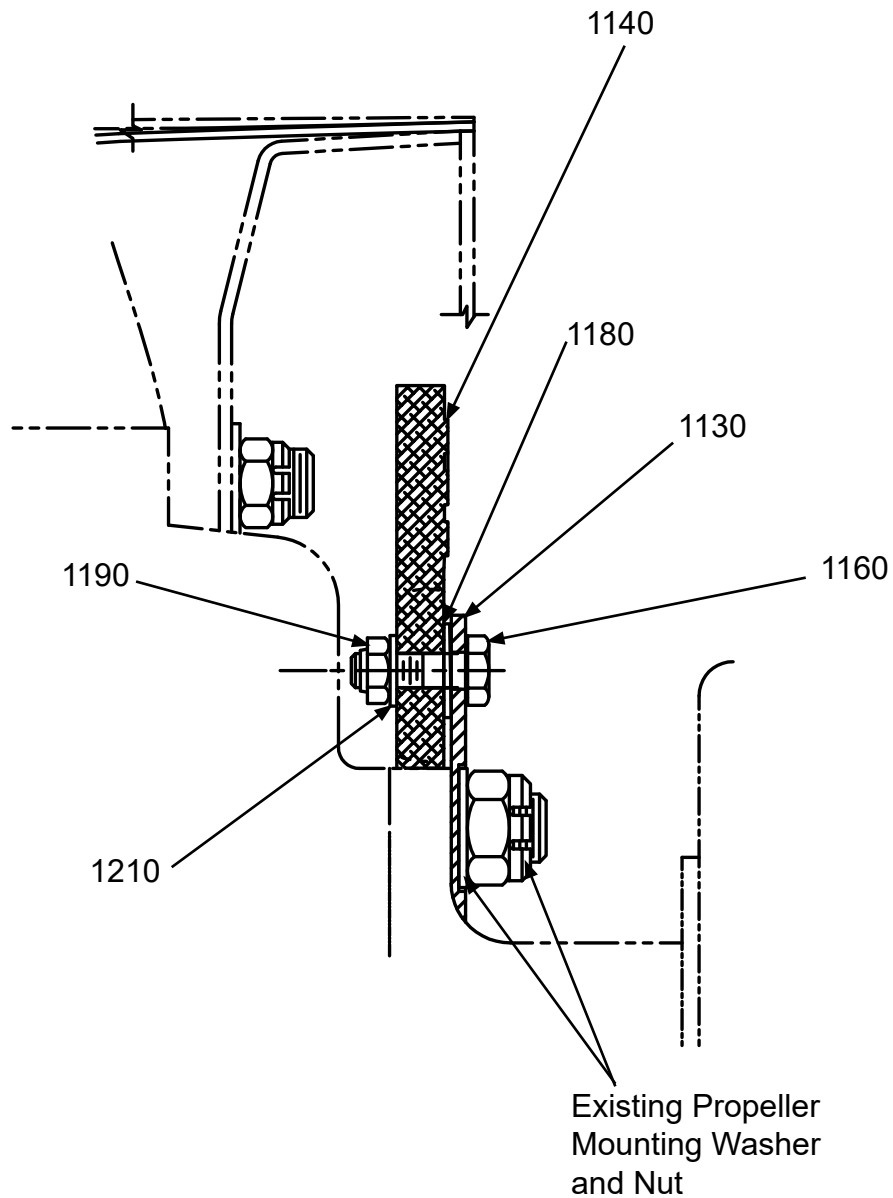


**Wire Harness to Counterweight Attachment  
Figure AG-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-65-600-1**

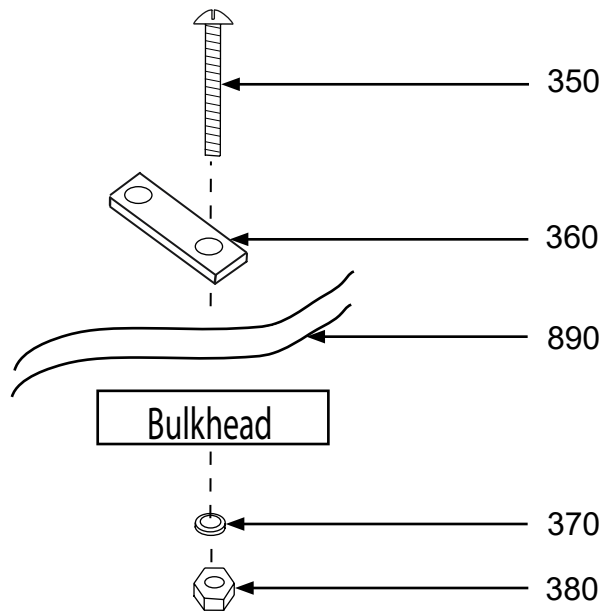


**Slip Ring Mounting  
Figure AG-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

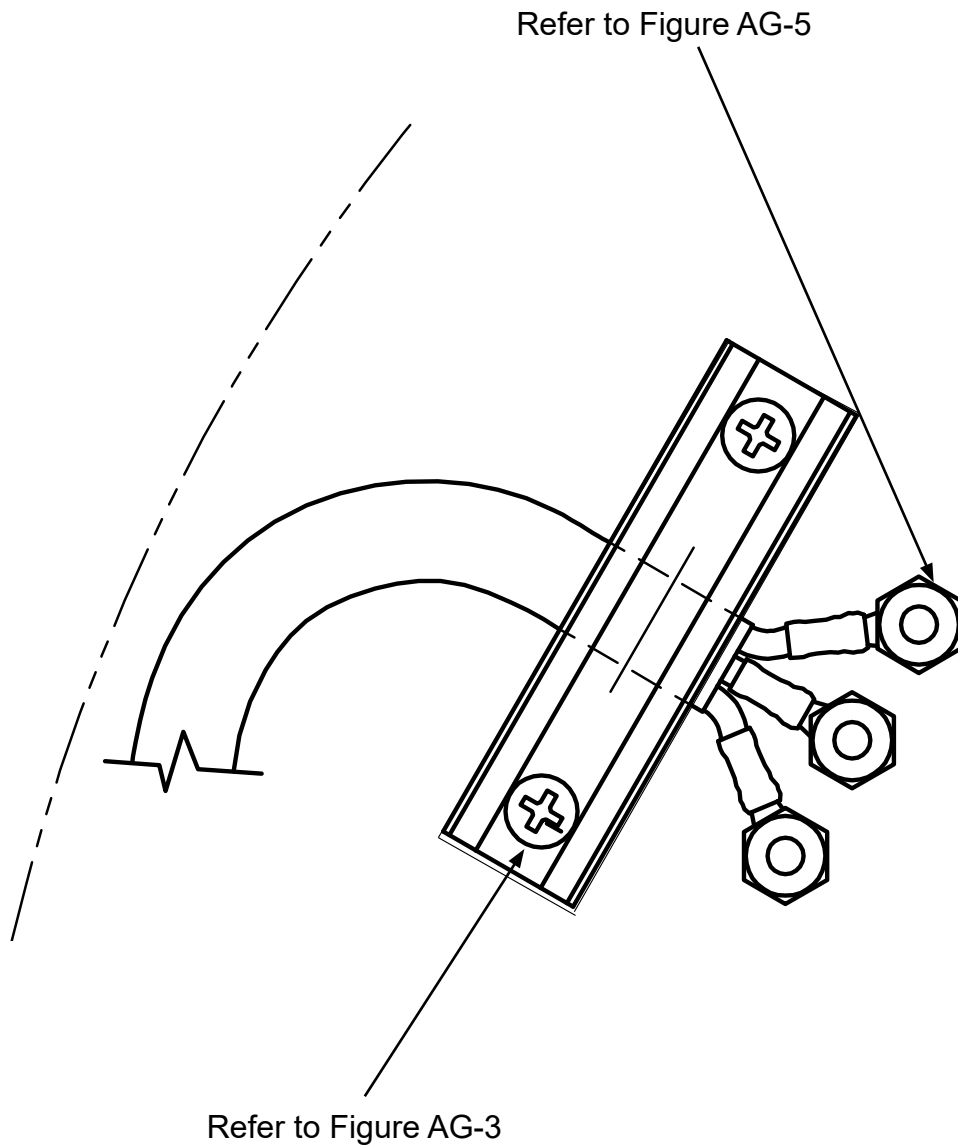
**7931-65-600-1**



**Lead Clip Attachment to Bulkhead  
Figure AG-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-600-1**



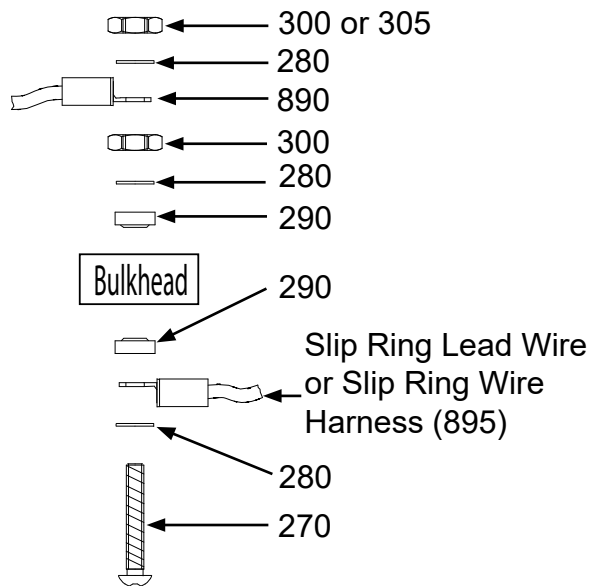
Lead wires may have two or 3 terminal ends.

**De-ice Wire Harness Routing  
Figure AG-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-65-600-1**



**Securing De-ice Wire Harness and Slip Ring Lead Wire to Bulkhead  
Figure AG-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-600-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-65-600-1</b>	<b>PROPELLER DE-ICE KIT INSTALLATION INSTRUCTION 11AG FIGURES: AG-1 THRU AG-5</b>		
270	B-7035-12	• SCREW, 6-32, PAN HEAD, BRASS	9	
280	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	27	Y
290	7931-2E1260	• INSULATING BUSHING SUPERSEDED BY ITEM 290A	18	
290A	2H1260	• INSULATING BUSHING SUPERSEDES ITEM 290	18	
300	B-6641-265	• NUT, HEX, BRASS	18	Y
350	B-6637-30	• SCREW, PAN HEAD, CRES.	6	
360	7931-3E1271-2	• CLIP, LEAD STRAP SUPERSEDED BY ITEM 360A	3	Y
360A	3H1271-2	• CLIP, LEAD STRAP SUPERSEDES ITEM 360	3	Y
370	B-3837-N632	• WASHER, CORROSION RESISTANT	6	Y
380	B-6655-06	• NUT, HEX, SELF-LOCKING	6	Y
890	7931-4E1967-3	• WIRE HARNESS SUPERSEDED BY ITEM 890A	3	Y
890A	4H1967-3	• WIRE HARNESS SUPERSEDES ITEM 890	3	Y
900	B-3852-1-0	• • STRAP, TIEDOWN, PLASTIC	1	Y
910	B-3852-2-0	• • STRAP, TIEDOWN, PLASTIC	2	Y
975	101902	• • TERMINAL, RING	3	
975A	7931-320619	• • AMP 320619 PIDG RING TERMINAL ALTERNATE FOR ITEM 975	3	
975B	7931-2-320619-1	• • AMP 320619 PIDG RING TERMINAL ALTERNATE FOR ITEM <b>975</b>	3	
1130	SAE-AMS-I-7444 7931-4E3153	• • CLEAR VINYL TUBING MOUNTING PLATE, SPLIT SUPERSEDED BY ITEM 1130A	2	
1130A	4H3153	• MOUNTING PLATE, SPLIT SUPERSEDES ITEM 1130	2	
1140	7931-4E1924-1	• SLIP RING ASSEMBLY SUPERSEDED BY ITEM 1140A	1	
1140A	4H1924-1	• SLIP RING ASSEMBLY SUPERSEDES ITEM 1140	1	
1160	B-3384-6H	• BOLT, 1/4-28, HEX HEAD	6	Y
1180	B-7077-52	• BELLEVILLE SPRING WASHER	6	Y
1190	B-3808-4	• NUT, HEX, SELF-LOCKING	6	
1210	B-3837-0432	• WASHER, CORROSION RESISTANT	6	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-65-600-1**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-65-600-4**

AH. Installation Instruction 11AH

- (1) Position the propeller blades at low blade angle or start lock angle.
- (2) Route the terminal end of the wire harness (890) through the hole in counterweight, as shown in Figure AH-1.
- (3) Assemble the plug connection between the wire harness (890) and the de-ice boot.
- (4) Install and tighten the tie strap (900) around the wire harness/de-ice boot plug connection.
- (5) Position the tie strap head (900) in the approximate location shown in Figure AH-1.
- (6) Install the clear vinyl tubing over the wire harness (890) until the clear vinyl tubing contacts the heat shrink tubing installed on the wire harness (890).
- (7) Install the AMP terminals (975) on the lead wires in accordance with the manufacturer's instructions.
- (8) Secure the wire harness/boot connection to the counterweight.
  - (a) Outboard Tie Strap (910) installation:
    - 1 Install tie straps (910) under the tie strap (900) connecting the wire harness/boot plugs, around the counterweight, and over the wire harness (890) as shown in Figure AH-1.
    - 2 Position the tie strap head in the approximate location shown on the side of the counterweight as shown in Figure AH-1. Do not tighten the tie strap (910) at this time.
  - (b) Inboard Tie Strap (910) installation:
    - 1 Install tie straps (910) under the tie strap (900) connecting the wire harness/boot plugs, around the counterweight, and under the wire harness (890) as shown in Figure AH-1.
    - 2 Position the tie strap head in the approximate location shown on the side of the counterweight as shown in Figure AH-1. Do not tighten the tie strap (910) at this time.
  - (c) Verify the wire harness (890) is taut through the counterweight hole.
  - (d) Tighten all of the tie straps (900 and 910).
- (9) Put the slip ring assembly (1140) on the engine flange.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-65-600-4**

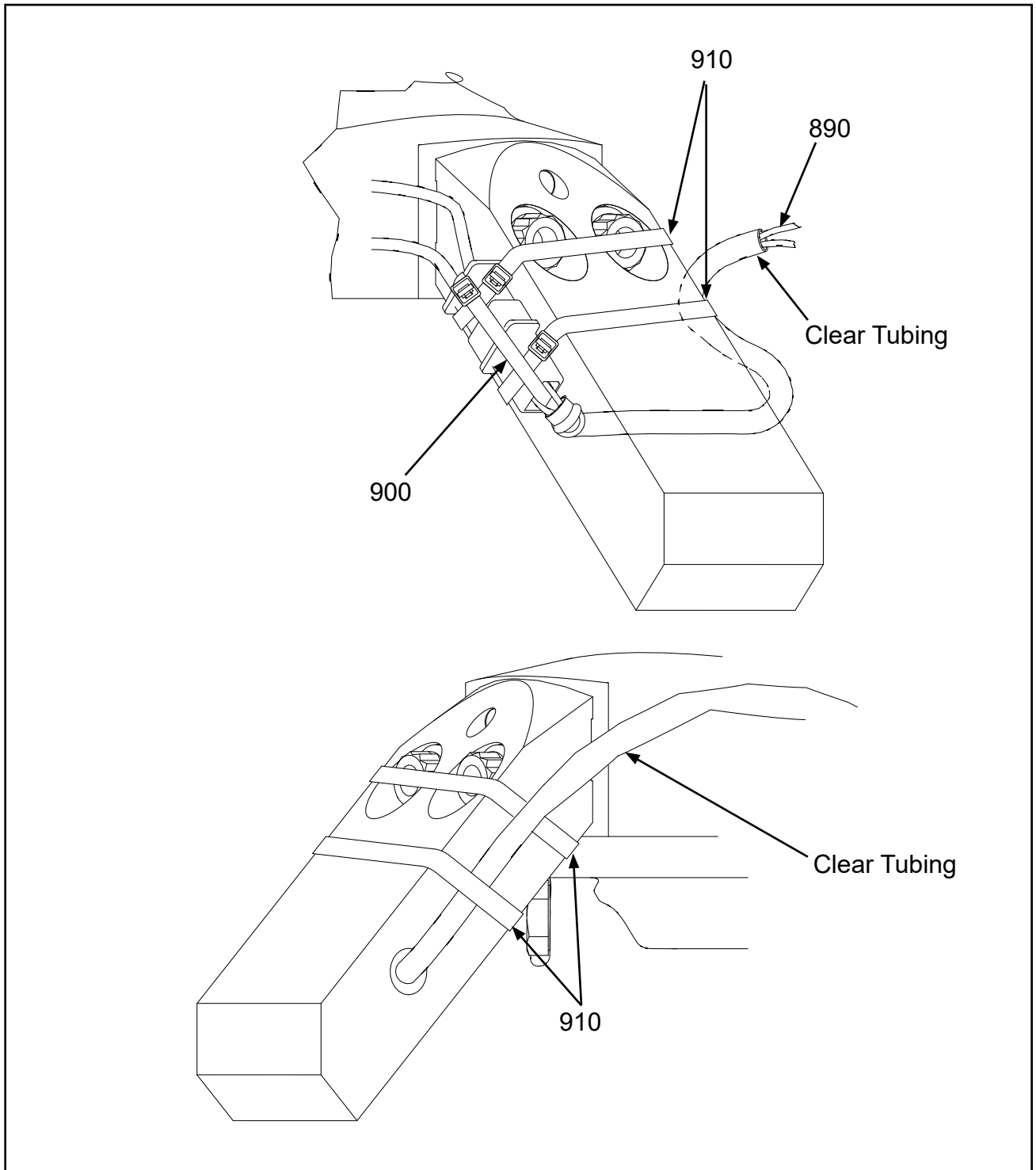
AH. Installation Instruction AH - continued

- (10) Using the belleville spring washer (1180), nut (1190), and washer (1210), attach the split mounting plate (1130) to the slip ring assembly (1140) in accordance with Figure AH-2.
- (11) Snug the nut (1190), do not torque at this time.
- (12) Install the propeller on the engine flange in accordance with Hartzell Owner's Manual 115N (61-00-15).
- (13) Using existing propeller mounting nuts and washers, attach the split mounting plate (1130)/slip ring assembly (114) to the propeller studs extending through the engine flange in accordance with Figure AH-2.
  - (a) The split between the split mounting plates (1130) must be aligned with the propeller dowel pins.
  - (b) Torque the mounting nuts in accordance with Hartzell Propeller Owner's Manual 115N (61-00-15).
- (14) Torque the bolts (1350) attaching the slip ring assembly (1140) to the split mounting plates (1130) to 40 - 120 in.-lbs. (4.5 - 14 N•m) to achieve slip ring (1140) run-out in accordance with the Check chapter of this manual.
- (15) Using screw (270) washer (280), insulating bushings (290), and nut (300 and/or 305), connect the de-ice wire harness (890) and the slip ring lead wires to the bulkhead in accordance with Figure AH-3.
- (16) Torque the nut (300) to 6-8 in. lbs. (0.6-0.9 N•m) and nut (305) 10-12 in. lbs. (1.1-1.3 N•m).
- (17) Using the lead clip (360), screw (350), washer (370) and nut (380), route the de-ice wire harness (890) as shown and attach to the bulkhead in accordance with Figure AH-4 and Figure AH-5.
- (18) Tighten the nut (380) until snug.
- (19) Using the hose clamp (830), wire rubber spacer (820), and wire harness cushion (800), secure the slip ring wire harness (895) to the hub as shown in Figure AH-6.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-65-600-4**

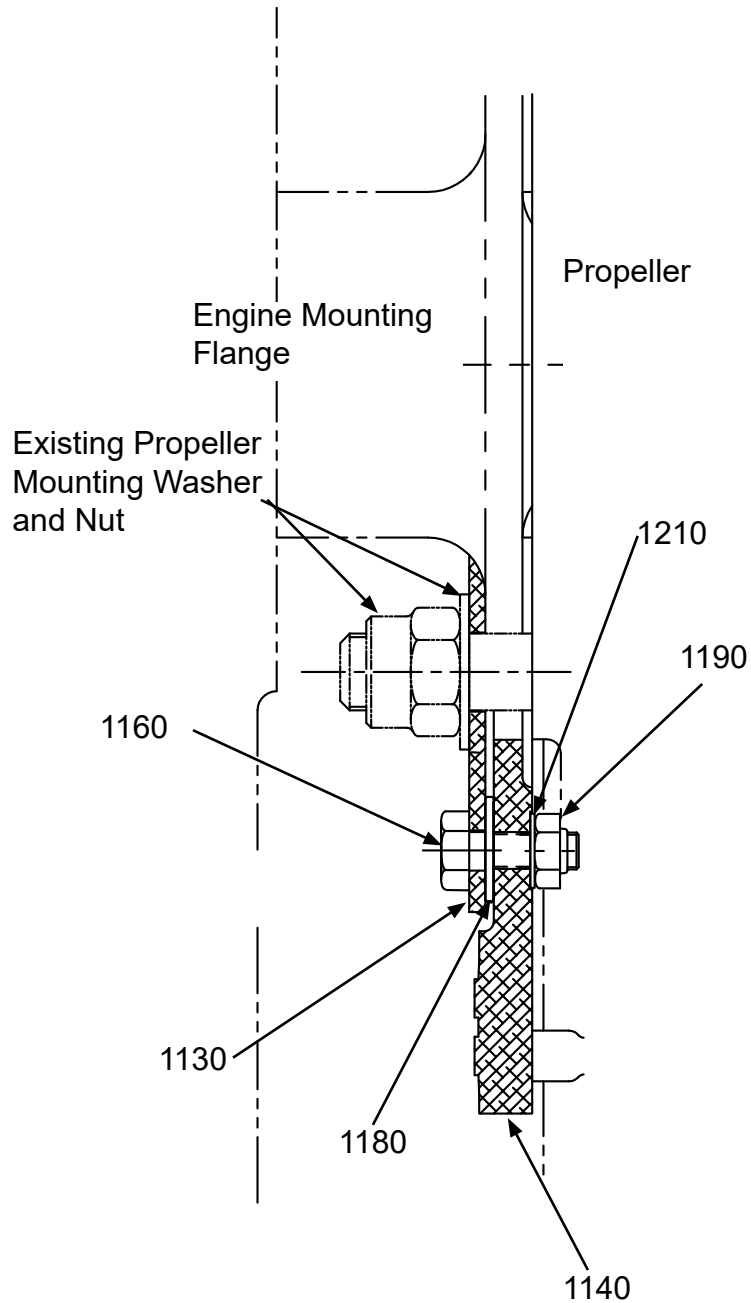


**Wire Harness to Counterweight Attachment  
Figure AH-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-65-600-4**

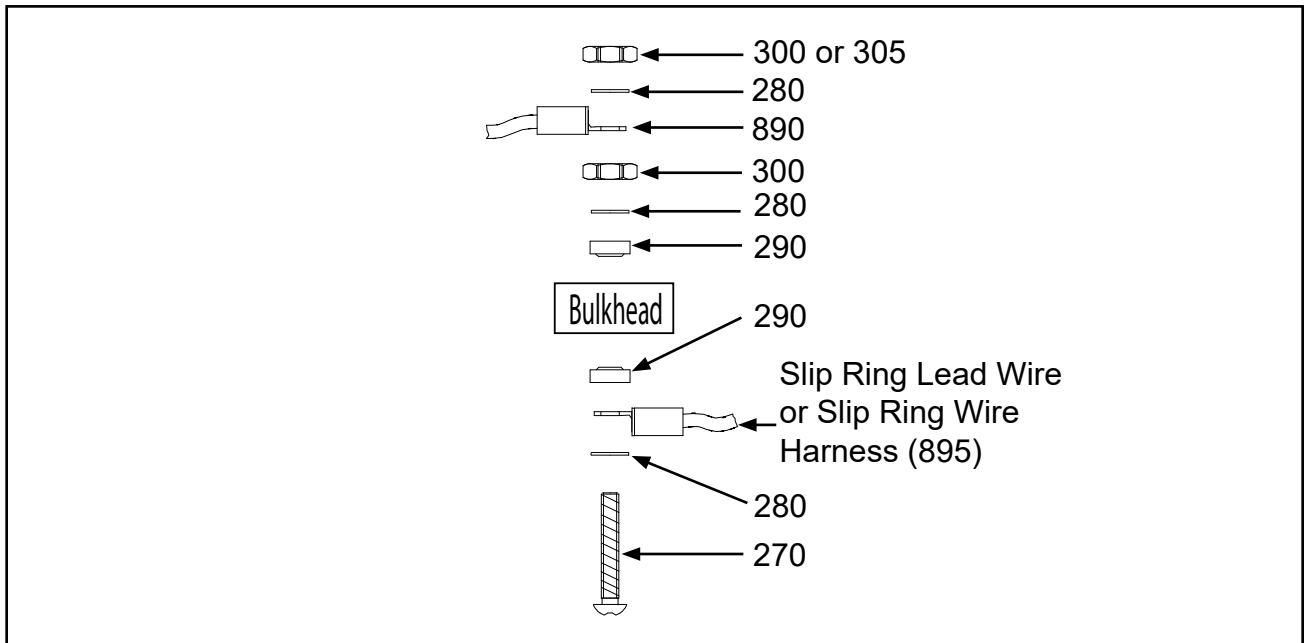


**Slip Ring Mounting  
Figure AH-2**

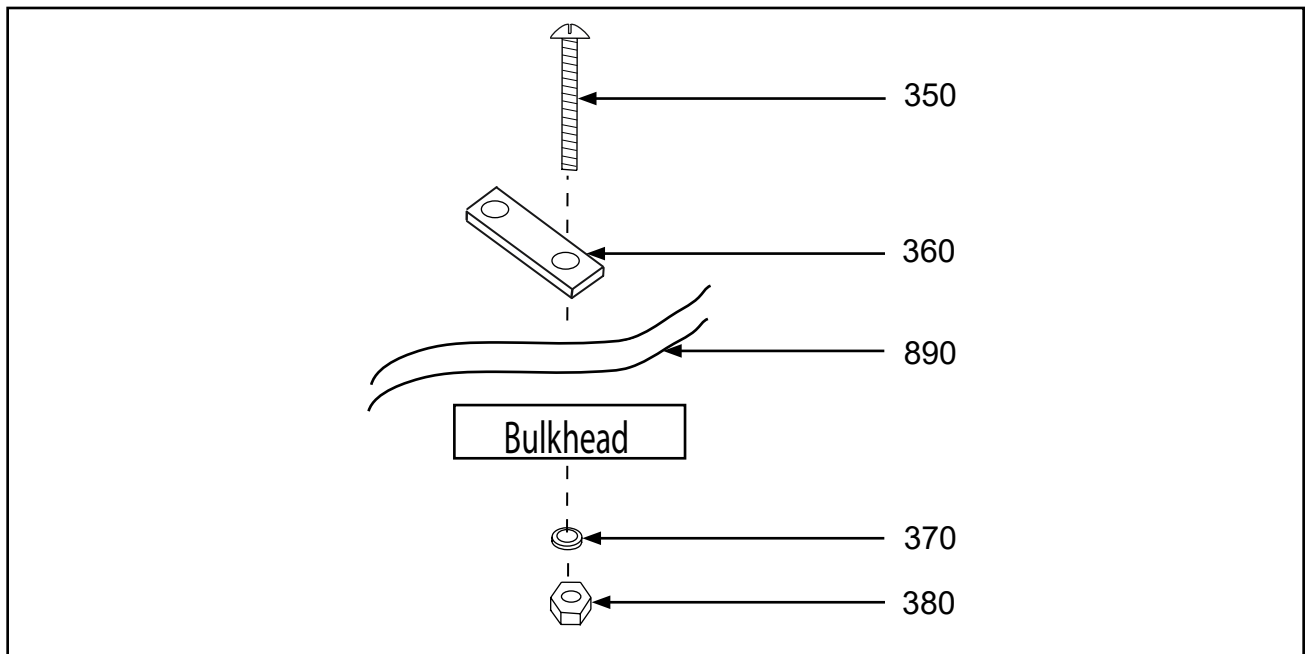
**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-65-600-4**



**Securing De-ice Wire Harness and Slip Ring Lead Wire to Bulkhead  
Figure AH-3**

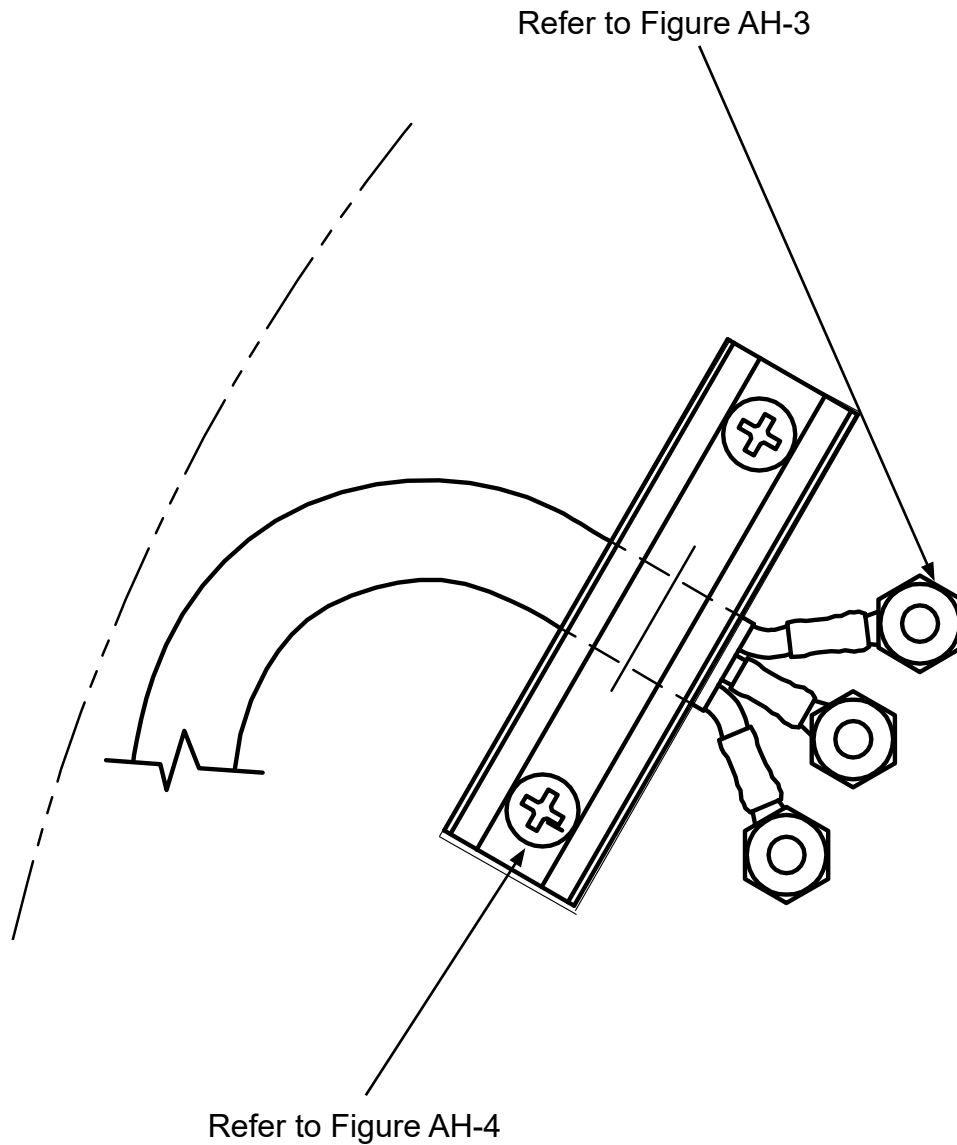


**Lead Clip Attachment to Bulkhead  
Figure AH-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-65-600-4**

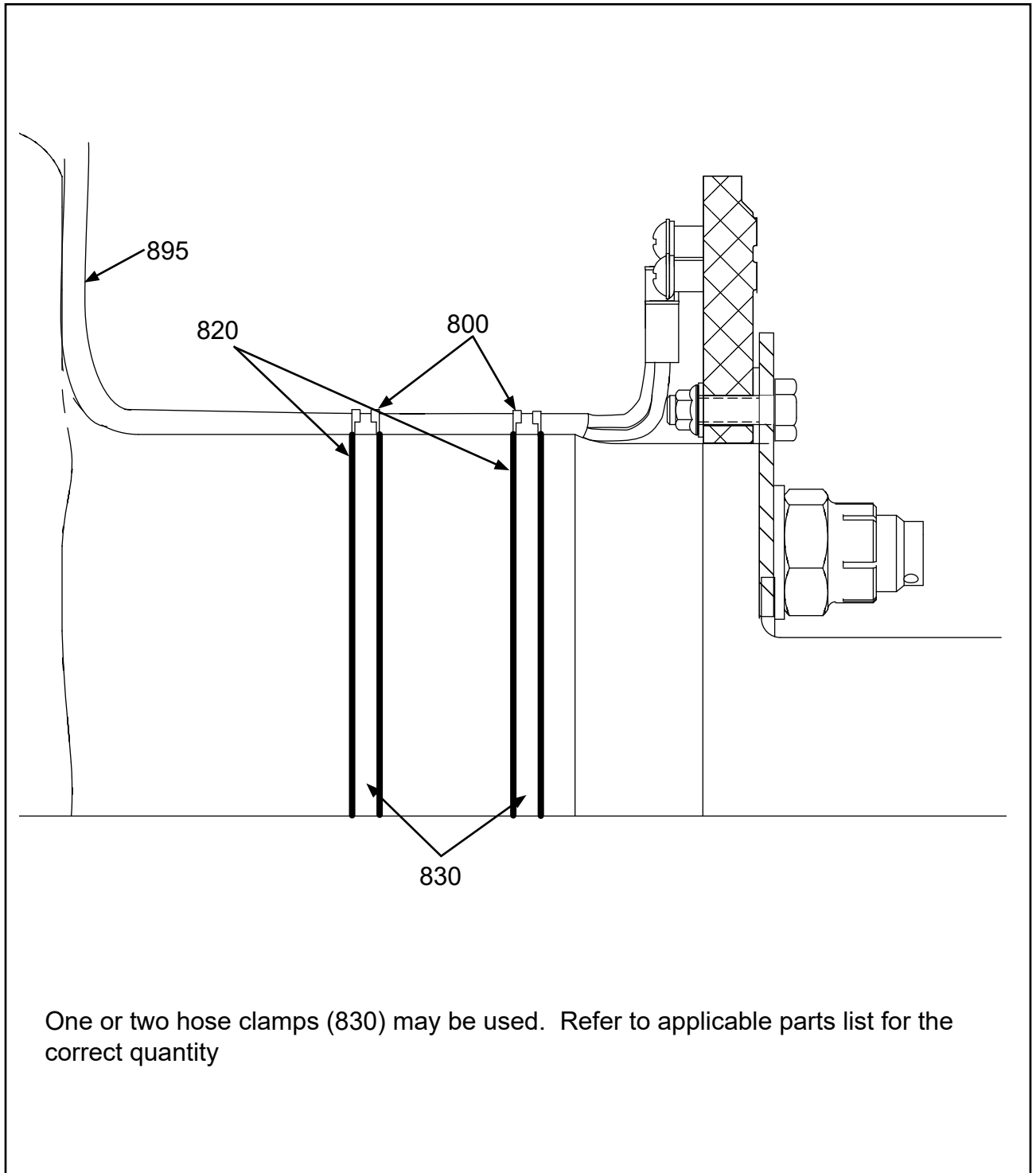


Lead wires may have two or 3 terminal ends.

**De-ice Wire Harness Routing  
Figure AH-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-600-4**



**Hose Clamp and Wire Harness Cushion Holding Slip Ring Wire Harness to Hub  
Figure AH-6**

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-600-4**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-65-600-4</b>	<b>PROPELLER DE-ICE KIT INSTALLATION INSTRUCTION 11AH FIGURES: AH-1 thru AH-6</b>		
270	B-7035-12	• SCREW, 6-32, PAN HEAD, BRASS	9	
280	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	27	Y
290	7931-2E1260	• INSULATING BUSHING SUPERSEDED BY ITEM 290A	18	
290A	2H1260	• INSULATING BUSHING SUPERSEDES ITEM 290	18	
300	B-6641-265	• NUT, HEX, BRASS	18	Y
350	B-6637-30	• SCREW, PAN HEAD, CRES.	6	
360	7931-3E1271-2	• CLIP, LEAD STRAP SUPERSEDED BY ITEM 360A	3	
360A	3H1271-2	• CLIP, LEAD STRAP SUPERSEDES ITEM 360	3	
370	B-3837-N632	• WASHER, CORROSION RESISTANT	6	Y
380	B-6655-06	• NUT, HEX, SELF-LOCKING	6	Y
890	7931-4H1967-3	• WIRE HARNESS SUPERSEDED BY ITEM 890A	3	Y
890A	4H1967-3	• WIRE HARNESS SUPERSEDES ITEM 890	3	Y
900	B-3852-1-0	• • STRAP, TIEDOWN, PLASTIC	1	Y
910	B-3852-2-0	• • STRAP, TIEDOWN, PLASTIC	2	Y
975	101902	• • TERMINAL, RING	3	
975A	7931-320619	• • AMP 320619 PIDG RING TERMINAL ALTERNATE FOR ITEM 975	3	
975B	7931-320619-1	• • AMP 320619-1 PIDG RING TERMINAL, ALTERNATE FOR ITEM 975	3	
1130	SAE-AMS-I-7444 7931-4E3153	• • CLEAR VINYL TUBING • MOUNTING PLATE, SPLIT SUPERSEDED BY ITEM 1130A	2	
1130A	4H3153	• MOUNTING PLATE, SPLIT SUPERSEDES ITEM 1130	2	
1140	7931-4E2459-2	• SLIP RING ASSEMBLY SUPERSEDED BY ITEM 1140A	1	
1140A	4H2459-2	• SLIP RING ASSEMBLY SUPERSEDES ITEM 1140	1	
1160	B-3384-6H	• BOLT, 1/4-28, HEX HEAD	6	Y
1180	B-7077-52	• BELLEVILLE SPRING WASHER	6	Y
1190	B-3808-4	• NUT, HEX, SELF-LOCKING	6	
1210	B-3837-0432	• WASHER, CORROSION RESISTANT	6	

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-65-600-4 (page 1 of 2)**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-65-600-4**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-65-600-4</b>	<b>PROPELLER DE-ICE KIT (CONTINUED)</b> <b>INSTALLATION INSTRUCTION 11AH</b> <b>FIGURES: AH-1 thru AH-6</b>		
800	7931-2E1307	• WIRE HARNESS CUSHION SUPERSEDED BY ITEM 800A	6	Y
800A	2H1307	• WIRE HARNESS CUSHION SUPERSEDES ITEM 800	6	Y
820	7931-3E1794	• WIRE HARNESS RUBBER SPACER SUPERSEDED BY ITEM 820A	6	
820A	3H1794	• WIRE HARNESS RUBBER SPACER SUPERSEDES ITEM 820	6	
830	7931-200-M80S	• QS-200-M80S HOSE CLAMP	2	
895	7931-3E2182	• WIRE HARNESS, SLIP RING SUPERSEDED BY ITEM 895A	3	
895A	3H2182	• WIRE HARNESS, SLIP RING SUPERSEDES ITEM 895	3	

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-65-600-4 (page 2 of 2)**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-600-4**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-616-1 and 7931-65-616-1B**

**AI.**    Installation Instruction 11AI

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 7E1803 Rev. B

- 1    Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

- a    The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)
- b    Hartzell Propeller Service Letter HC-SL-30-259
- c    Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-616-1 and 7931-65-616-1B**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-65-616-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11AI</b>		
	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-2	4	
	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-2	4	
	B-3854-41	• WASHER, LOCK (2 REQ)	16	Y
	B-6631-233	• SCREW, 6-32, FILLISTER HEAD, CRES	8	Y
	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	4	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
	B-6976-10	• SCREW, 8-32, WASHER HEAD	4	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	8	Y
	3H1883-2	• ASSEMBLY, TERMINAL CLAMP SUPERSEDES 7931-3E1883-2	4	
	B-3864-37	• • WASHER, LOCK, INTERNAL TOOTH	3	Y
	B-6641-265	• • NUT, HEX, BRASS	3	
	7931-3E1883-2	• ASSEMBLY, TERMINAL CLAMP SUPERSEDED BY 3H1883-2	4	
	B-3864-38	• WASHER, LOCK, INTERNAL TOOTH	4	Y
	B-3840-8	• SCREW, 10-32, FILLISTER HEAD	8	Y
	B-6977-8	• SCREW, 8-32, FILLISTER HEAD	4	Y
	B-3837-0332	• WASHER, CORROSION RESISTANT	8	Y
	B-6735	• CLAMP, LOOP, CUSHIONED	4	Y
	4H1889-2	• DE-ICE WIRE HARNESS SUPERSEDES 7931-4E1889-2	4	Y
	7931-4E1889-2	• DE-ICE WIRE HARNESS SUPERSEDED BY 4H1889-2	4	Y
	4H1933-7	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E1933-7	1	
	7931-4E1933-7	• SLIP RING ASSEMBLY SUPERSEDED BY 4H1933-7	1	
	B-3384-26H	• BOLT, 1/4-28, HEX HEAD	8	Y
	B-3865-15A	• BOLT, 1/4-28, HEX HEAD, CRES SUPERSEDED BY 102831	4	Y
	102831	• BOLT, 1/4-28, HEX HEAD, CRES SUPERSEDES B-3865-15A	4	Y
	B-7076-42	• BELLEVILLE SPRING WASHER	36	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	12	Y
	B-3837-0463	• WASHER, CORROSION RESISTANT	20	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-65-616-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-616-1 and 7931-65-616-1B**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-65-616-1B</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11AI</b>		
	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-2	4	
	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-2	4	
	B-3854-41	• WASHER, LOCK (2 REQ)	16	Y
	B-6631-233	• SCREW, 6-32, FILLISTER HEAD, CRES	8	Y
	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	4	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
	B-6976-10	• SCREW, 8-32, WASHER HEAD	4	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	8	Y
	3H1883-2	• ASSEMBLY, TERMINAL CLAMP SUPERSEDES 7931-3E1883-2	4	
	B-3864-37	• • WASHER, LOCK, INTERNAL TOOTH	3	Y
	B-6641-265	• • NUT, HEX, BRASS	3	
	7931-3E1883-2	• ASSEMBLY, TERMINAL CLAMP SUPERSEDED BY 3H1883-2	4	
	B-3864-38	• WASHER, LOCK, INTERNAL TOOTH	4	Y
	B-3840-8	• SCREW, 10-32, FILLISTER HEAD	8	Y
	B-6977-8	• SCREW, 8-32, FILLISTER HEAD	4	Y
	B-3837-0332	• WASHER, CORROSION RESISTANT	8	Y
	B-6735	• CLAMP, LOOP, CUSHIONED	4	Y
	4H1889-2	• DE-ICE WIRE HARNESS SUPERSEDES 7931-4E1889-2	4	Y
	7931-4E1889-2	• DE-ICE WIRE HARNESS SUPERSEDED BY 4H1889-2	4	Y
	4H1933-7	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E1933-7	1	
	7931-4E1933-7	• SLIP RING ASSEMBLY SUPERSEDED BY 4H1933-7	1	
	B-3384-26H	• BOLT, 1/4-28, HEX HEAD	8	Y
	B-3865-15A	• BOLT, 1/4-28, HEX HEAD, CRES SUPERSEDED BY 102831	4	Y
	102831	• BOLT, 1/4-28, HEX HEAD, CRES SUPERSEDES B-3865-15A	4	Y
	B-7076-42	• BELLEVILLE SPRING WASHER	36	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	12	Y
	B-3837-0463	• WASHER, CORROSION RESISTANT	20	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-65-616-1B**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-65-616-1 and 7931-65-616-1B**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-050-1**

AJ. Installation Instruction 11AJ

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 7E1534 Rev. G

- 1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)

b Hartzell Propeller Service Letter HC-SL-30-259

c Hartzell Propeller Service Letter HC-SL-30-260

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions for the following electric de-ice kit(s):

**7931-67-050-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-050-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11AJ</b>		
	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-3	3	
	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-3	3	
	B-3854-41	• WASHER, LOCK	6	Y
	B-6631-233	• SCREW, 6-32, FILLISTER HEAD, CRES (REFER TO NOTE)	6	Y
	B-6631-232	• SCREW, 6-32, FILLISTER HEAD, CRES. (REFER TO NOTE) ALTERNATE FOR B-6631-233	AR	Y
	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	3	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	3	Y
	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	3	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	3	Y
	3H2092-2	• WIRE HARNESS SUPERSEDES 7931-3E2092-2	3	Y
	7931-3E2092-2	• WIRE HARNESS SUPERSEDED BY 3H2092-2	3	Y
	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	6	Y
	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	3	Y
	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	6	Y
	4H2442-1	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E2442-1	1	
	7931-4E2442-1	• SLIP RING ASSEMBLY SUPERSEDED BY 4H2442-1	1	
	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	12	Y
	B-7077-52	• BELLEVILLE SPRING WASHER	12	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	12	Y
	B-3837-0432	• WASHER, CORROSION RESISTANT	12	Y
<b>NOTE:</b> MINIMUM PERMITTED THREAD ENGAGEMENT IS ONE THREAD BELOW THE END OF THE RIVNUT.				

**- ITEM NOT ILLUSTRATED**

**De-ice Kit(s): 7931-67-050-1**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-060-2, 7931-67-060-4, and 7931-67-060-4AL**

**AK. Installation Instruction 11AK**

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 7E1470 Rev. R

- 1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)

b Hartzell Propeller Service Letter HC-SL-30-259

c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-060-2, 7931-67-060-4, and 7931-67-060-4AL**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-060-2</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11AK</b>		
	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-3	4	
	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-3	4	
	B-3854-41	• WASHER, LOCK	8	Y
	B-6631-231	• SCREW, 6-32, FILLISTER HEAD, CRES	8	Y
	B-6735	• CLAMP, LOOP, CUSHIONED	4	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	8	Y
	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-3	4	
	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-3	4	
	B-6631-233	• SCREW, 6-32, FILLISTER HEAD, CRES	8	Y
	B-3854-41	• WASHER, LOCK	8	Y
	B-3856-243	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
	B-6735	• CLAMP, LOOP, CUSHIONED	4	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
	3H2017-8	• WIRE HARNESS SUPERSEDES 7931-3E2017-8	4	Y
	7931-3E2017-8	• WIRE HARNESS SUPERSEDED BY 3H2017-8	4	Y
	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	4	Y
	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	4	Y
	7931-36151	• AMP 36151 PIDG RING TERMINAL SUPERSEDED BY 108318	8	Y
	108318	• TERMINAL, RING SUPERSEDES 7931-36151	8	Y
	4H2444-1	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E2444-1	1	
	7931-4E2444-1	• SLIP RING ASSEMBLY SUPERSEDED BY 4H2444-1	1	
	A-2070-10	• SCREW, 1/4-28, BUTTON HEAD	12	Y
	B-7077-52	• BELLEVILLE SPRING WASHER	24	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	12	Y
	B-3837-0432	• WASHER, CORROSION RESISTANT	12	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-67-060-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-060-2, 7931-67-060-4, and 7931-67-060-4AL**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-060-4</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11AK</b>		
	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-3	4	
	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-3	4	
	B-3854-41	• WASHER, LOCK	8	Y
	B-6631-233	• SCREW, 6-32, FILLISTER HEAD, CRES	8	Y
	B-6735	• CLAMP, LOOP, CUSHIONED	4	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	8	Y
	3H2092-2	• WIRE HARNESS SUPERSEDES 7931-3E2092-2	4	Y
	7931-3E2092-2	• WIRE HARNESS SUPERSEDED BY 3H2092-2	4	Y
	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	4	Y
	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	8	Y
	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	8	Y
	4H2444-1	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E2444-1	1	
	7931-4E2444-1	• SLIP RING ASSEMBLY SUPERSEDED BY 4H2444-1	1	
	A-2070-10	• SCREW, 1/4-28, BUTTON HEAD	12	Y
	B-7077-52	• BELLEVILLE SPRING WASHER	24	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	12	Y
	B-3837-0432	• WASHER, CORROSION RESISTANT	12	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-67-060-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-060-2, 7931-67-060-4, and 7931-67-060-4AL**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-060-4AL</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11AK</b>		
	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-3	4	
	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-3	4	
	B-3854-41	• WASHER, LOCK	8	Y
	B-6631-233	• SCREW, 6-32, FILLISTER HEAD, CRES	8	Y
	B-6735	• CLAMP, LOOP, CUSHIONED	4	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	8	Y
	3H2092-2	• WIRE HARNESS SUPERSEDES 7931-3E2092-2	4	Y
	7931-3E2092-2	• WIRE HARNESS SUPERSEDED BY 3H2092-2	4	Y
	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	4	Y
	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	8	Y
	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	8	Y
	7931-4E2444-1	• SLIP RING ASSEMBLY SUPERSEDED BY 4H2444-1	1	
	4H2444-1	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E2444-1	1	
	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	12	Y
	B-7077-52	• BELLEVILLE SPRING WASHER	24	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	12	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-67-060-4AL**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-110-1**

AL. Installation Instruction 11AL

- (1) Refer to the Goodrich Corporation drawing listed below for installation instructions - except install the loop clamp hardware in accordance with Figure AL-1 in this section:

(a) 7E1389 Rev. J

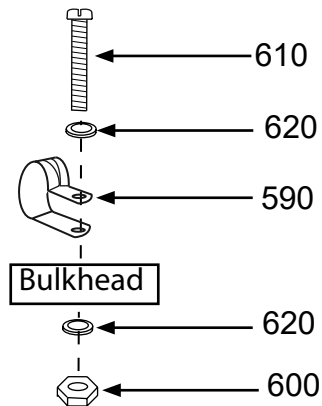
- 1 Refer to the following Hartzell Propeller LLC documents for cross-reference information about Goodrich Corporation part numbers:

- a The Vendor Cross-Reference chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02)
- b Hartzell Propeller Service Letter HC-SL-30-259
- c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-110-1**



**Loop Clamp to Bulkhead Attachment  
Figure AL-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-110-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-110-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11AL FIGURE: AL-1</b>		
	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-3	4	
	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-3	4	
	B-3854-41	• WASHER, LOCK	8	Y
	B-6631-233	• SCREW, 6-32, FILLISTER HEAD, CRES	8	Y
590	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	4	Y
600	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
610	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
620	B-3837-N832	• WASHER, CORROSION RESISTANT	8	Y
	3H2092-2	• WIRE HARNESS SUPERSEDES 7931-3E2092-2	4	Y
	7931-3E2092-2	• WIRE HARNESS SUPERSEDED BY 3H2092-2	4	Y
	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	8	Y
	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	4	Y
	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	8	Y
	7931-4E2350-1	• SLIP RING ASSEMBLY	1	
	B-3865-15A	• BOLT, 1/4-28, HEX HEAD, CRES SUPERSEDED BY 102831	4	Y
	102831	• BOLT, 1/4-28, HEX HEAD, CRES SUPERSEDES B-3865-15A	4	Y
	B-3384-26H	• BOLT, 1/4-28, HEX HEAD	8	Y
	B-3865-16A	• BOLT, 1/4-28, HEX HEAD, CRES ALTERNATE FOR B-3384-26H	8	Y
	B-7077-52	• BELLEVILLE SPRING WASHER REPLACED BY B-7077-42	36	Y
	B-7077-42	• BELLEVILLE SPRING WASHER REPLACES B-7077-52	36	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	12	Y
	B-3837-0432	• WASHER, CORROSION RESISTANT	12	Y
	B-3837-0463	• WASHER, CORROSION RESISTANT	20	Y
	B-3865-13A	• BOLT, 1/4-28, HEX HEAD, CRES	4	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-67-110-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-110-1**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-125-3**

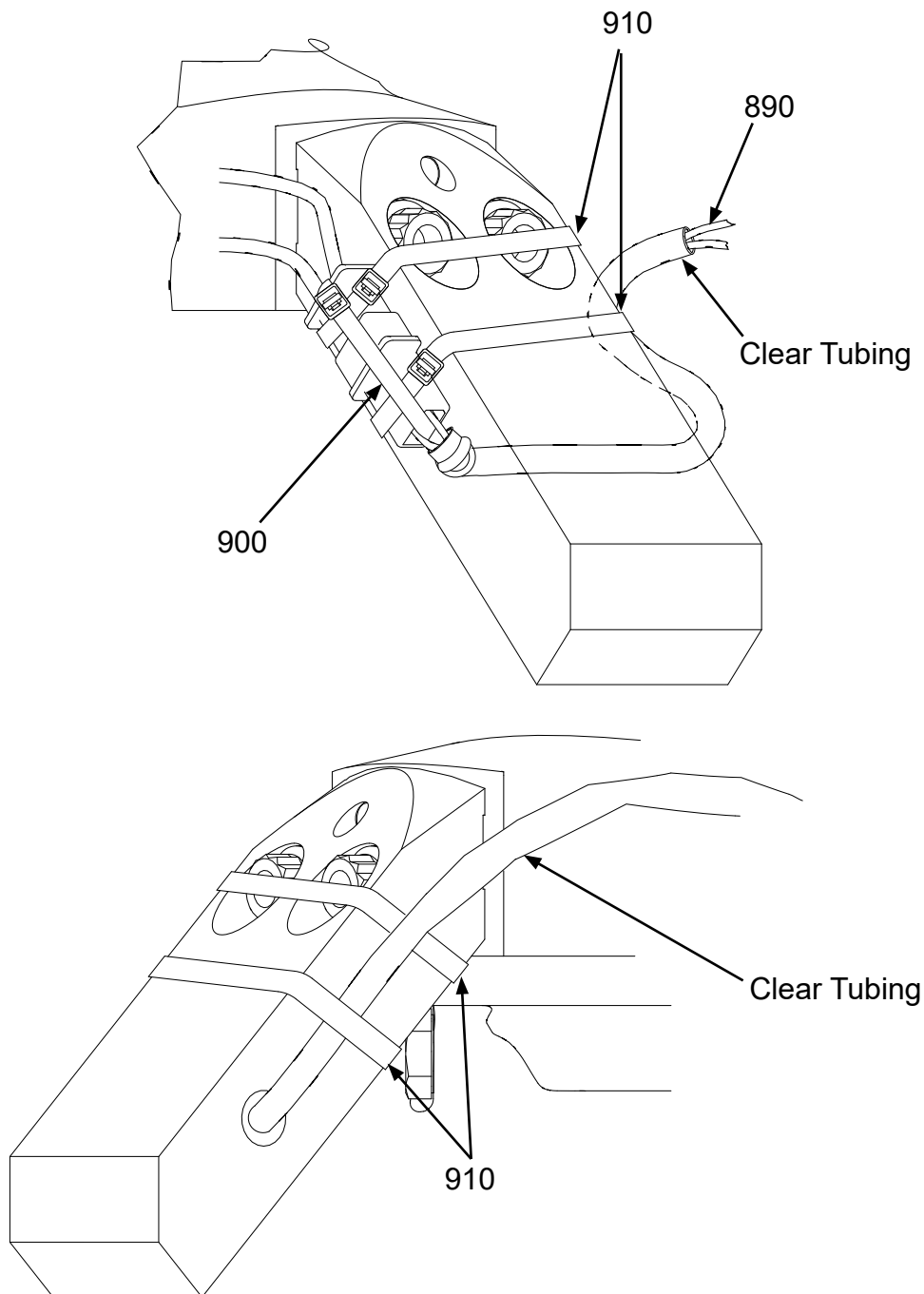
**AM. Installation Instruction 11AM**

- (1) Position the propeller blades at low blade angle or start lock angle.
- (2) Route the terminal end of the wire harness (890) through the hole in counterweight, as shown in Figure AM-1.
- (3) Assemble the plug connection between the wire harness (890) and the de-ice boot.
- (4) Install and tighten the tie strap (900) around the wire harness/de-ice boot plug connection.
- (5) Position the tie strap head (900) in the approximate location shown in Figure AM-1.
- (6) Install the clear vinyl tubing over the wire harness (890) until the clear vinyl tubing contacts the heat shrink tubing installed on the wire harness (890).
- (7) Install the AMP terminals (975) on the lead wires in accordance with the manufacturer's instructions.
- (8) Secure the wire harness/boot connection to the counterweight.
  - (a) Outboard Tie Strap (910) installation:
    - 1 Install tie straps (910) under the tie strap (900), connecting the wire harness/boot plugs, around the counterweight, and over the wire harness (890) as shown in Figure AM-1.
    - 2 Position the tie strap head in the approximate location shown on the side of the counterweight as shown in Figure AM-1. Do not tighten the tie strap (910) at this time.
  - (b) Inboard Tie Strap (910) installation:
    - 1 Install tie straps (910) under the tie strap (900), connecting the wire harness/boot plugs, around the counterweight, and under the wire harness (890) as shown in Figure AM-1.
    - 2 Position the tie strap head in the approximate location shown on the side of the counterweight as shown in Figure AM-1. Do not tighten the tie strap (910) at this time.
  - (c) Verify that the wire harness (890) is taut through the counterweight hole.
  - (d) Tighten all of the tie straps (900 and 910).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-125-3**



**Wire Harness to Counterweight Attachment  
Figure AM-1**

# **HARTZELL ICE PROTECTION SYSTEM MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

## **7931-67-125-3**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-125-3</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11AM FIGURE: AM-1</b>		
890	7931-3E2050	• WIRE HARNESS SUPERSEDED BY ITEM 890A	3	Y
890A	3H2050	• WIRE HARNESS SUPERSEDES ITEM 890	3	Y
900	B-3852-1-0	• • STRAP, TIEDOWN, PLASTIC	1	Y
910	B-3852-2-0	• • STRAP, TIEDOWN, PLASTIC	2	Y
975	101902	• • TERMINAL, RING	2	
975A	7931-320619	• • AMP 320619 PIDG RING TERMINAL ALTERNATE FOR ITEM 975	2	
975B	7931-2-320619-1	• • AMP 320619 PIDG RING TERMINAL ALTERNATE FOR ITEM 975	2	
	SAE-AMS-I-7444	• • CLEAR VINYL TUBING		

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-67-125-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-125-3**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-240-1**

**AN. Installation Instruction 11AN**

- (1) Position the propeller blades at low blade angle or start lock angle.
- (2) Route the terminal end of the wire harness (890) through the hole in counterweight, as shown in Figure AN-1.
- (3) Assemble the plug connection between the wire harness (890) and the de-ice boot.
- (4) Install and tighten the tie strap (900) around the wire harness/de-ice boot plug connection.
- (5) Position the tie strap head (900) in the approximate location shown in Figure AN-1.
- (6) Install the clear vinyl tubing over the wire harness (890) until the clear vinyl tubing contacts the heat shrink tubing installed on the wire harness (890).
- (7) Install the AMP terminals (975) on the lead wires in accordance with the manufacturer's instructions.
- (8) Secure the wire harness/boot connection to the counterweight.
  - (a) Outboard Tie Strap (910) installation:
    - 1 Install tie straps (910) under the tie strap (900), connecting the wire harness/boot plugs, around the counterweight, and over the wire harness (890) as shown in Figure AN-1.
    - 2 Position the tie strap head in the approximate location shown on the side of the counterweight as shown in Figure AN-1. Do not tighten the tie strap (910) at this time.
  - (b) Inboard Tie Strap (910) installation:
    - 1 Install tie straps (910) under the tie strap (900), connecting the wire harness/boot plugs, around the counterweight, and under the wire harness (890) as shown in Figure AN-1.
    - 2 Position the tie strap head in the approximate location shown on the side of the counterweight as shown in Figure AN-1. Do not tighten the tie strap (910) at this time.
  - (c) Verify that the wire harness (890) is taut through the counterweight hole.
  - (d) Tighten all of the tie straps (900 and 910).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

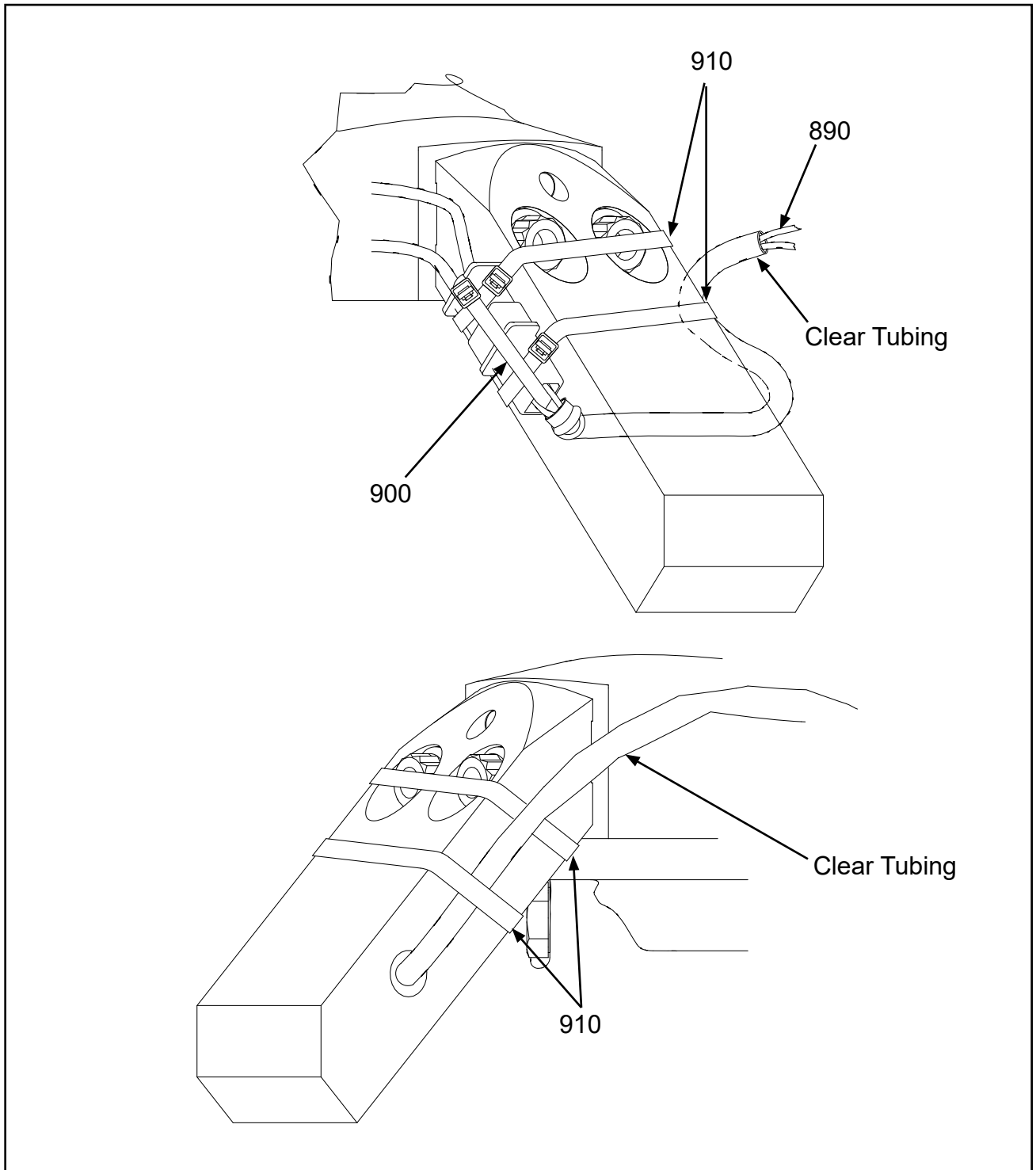
**7931-67-240-1**

AN. Installation Instruction 11AN - continued

- (9) Using screw (270) washer (280), insulating bushings (290), and nut (300 and/or 305), connect the de-ice wire harness (890) and the slip ring wire harness (895) to the bulkhead in accordance with Figure AN-2.
- (10) Torque the nut (300) to 6-8 in. lbs. (0.6-0.9 N•m) and nut (305) 10-12 in. lbs. (1.1-1.3 N•m).
- (11) Using the lead clip (360), screw (350), washer (370) and nut (380), route the de-ice wire harness (890) as shown and attach to the bulkhead in accordance with Figure AN-3 and Figure AN-4.
  - (a) Tighten the nut (380) until snug.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-240-1**

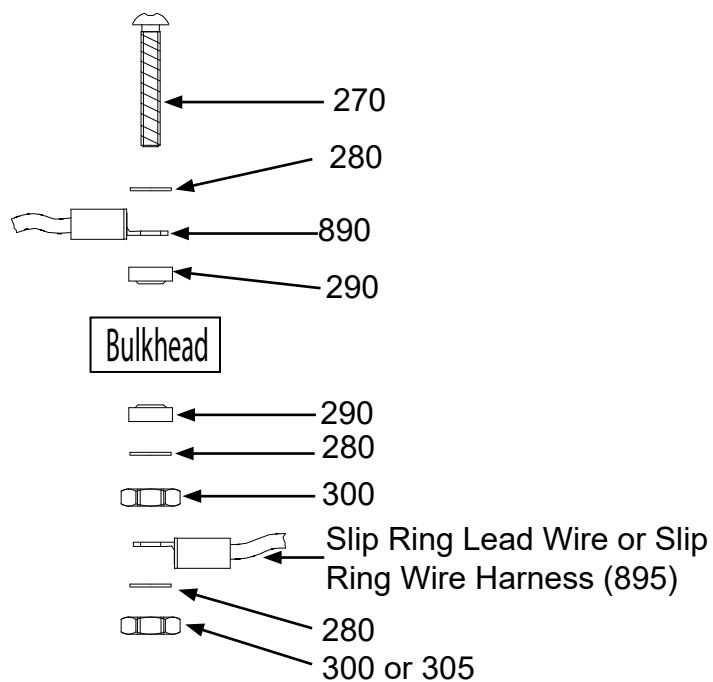


**Wire Harness to Counterweight Attachment  
Figure AN-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-240-1**

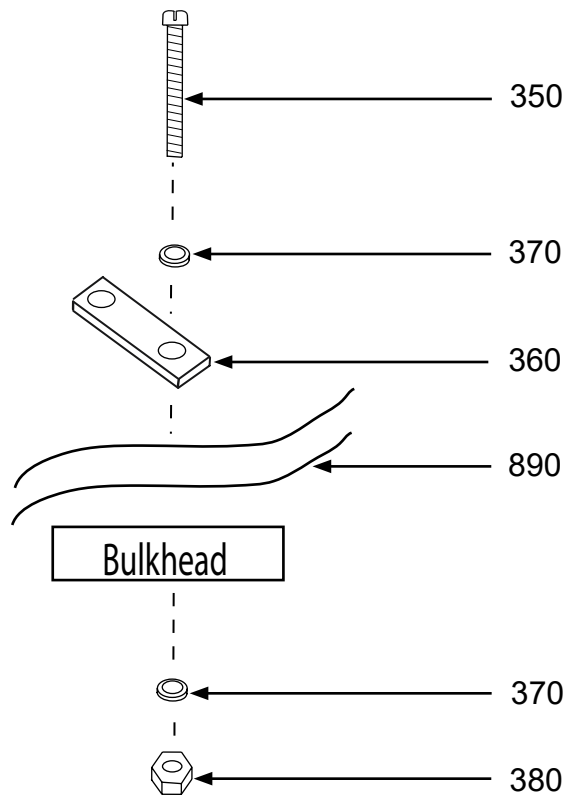


**Securing De-ice Wire Harness and Slip Ring Lead Wire to Bulkhead  
Figure AN-2**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

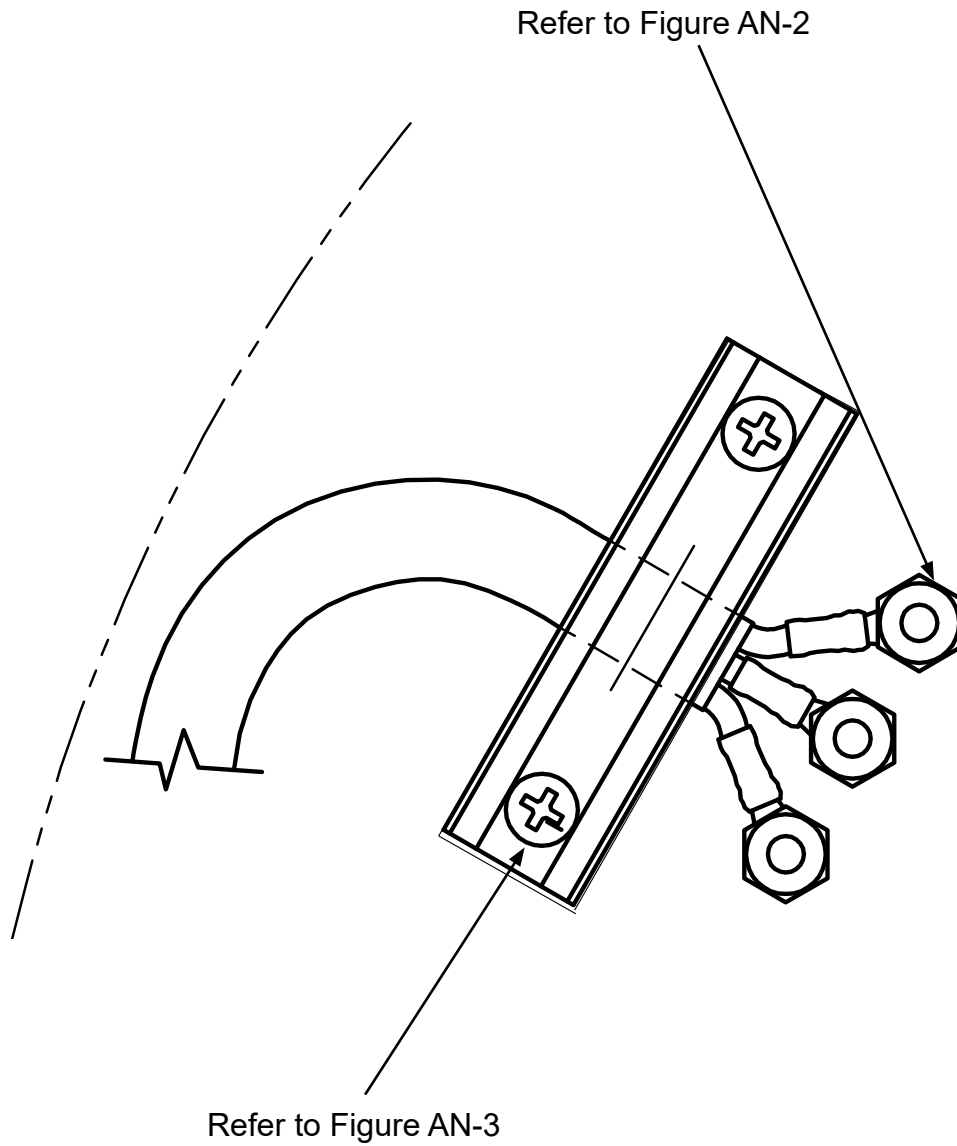
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-240-1**



**Lead Clip Attachment to Bulkhead  
Figure AN-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-240-1**



Lead wires may have two or 3 terminal ends.

**De-ice Wire Harness Routing  
Figure AN-4**

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

## 7931-67-240-1

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-240-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11AN FIGURES: AN-1 thru AN-4</b>		
270	B-7035-12	• SCREW, 6-32, PAN HEAD, BRASS	6	
280	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	18	Y
290	7931-2E1260	• INSULATING BUSHING SUPERSEDED BY ITEM 290A	12	
290A	2H1260	• INSULATING BUSHING SUPERSEDES ITEM 290	12	
300	B-6641-265	• NUT, HEX, BRASS	12	Y
350	B-6631-230	• SCREW, 6-32, FILLISTER HEAD, CRES	6	
360	3H1271-2	• CLIP, LEAD STRAP SUPERSEDES ITEM 360A	3	
360A	7931-3E1271-2	• CLIP, LEAD STRAP SUPERSEDED BY ITEM 360	3	
370	B-3837-N632	• WASHER, CORROSION RESISTANT	12	Y
380	B-6655-06	• NUT, HEX, SELF-LOCKING	6	Y
890	3H2050	• WIRE HARNESS SUPERSEDES ITEM 890A	3	Y
900	B-3852-1-0	• • STRAP, TIEDOWN, PLASTIC	1	Y
910	B-3852-2-0	• • STRAP, TIEDOWN, PLASTIC	2	Y
975	101902	• • TERMINAL, RING	2	
975A	7931-320619	• • AMP 320619 PIDG RING TERMINAL ALTERNATE FOR ITEM 975	2	
975B	7931-2-320619-1	• • AMP 320619 PIDG RING TERMINAL ALTERNATE FOR ITEM 975	2	
890A	SAE-AMS-I-7444 7931-3E2050	• • CLEAR VINYL TUBING • WIRE HARNESS SUPERSEDED BY ITEM 890	3	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-67-240-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-240-1**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-245-1**

AO. Installation Instruction 11AO

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 7E1487 Rev. K

- 1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)

b Hartzell Propeller Service Letter HC-SL-30-259

c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-245-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-245-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11AO</b>		
	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-3	5	
	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-3	5	
	B-6631-231	• SCREW, 6-32, FILLISTER HEAD, CRES	10	Y
	B-3854-41	• WASHER, LOCK	10	Y
	B-6735	• CLAMP, LOOP, CUSHIONED	5	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	5	Y
	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	5	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	10	Y
	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-3	5	
	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-3	5	
	B-6631-233	• SCREW, 6-32, FILLISTER HEAD, CRES	10	Y
	B-3854-41	• WASHER, LOCK	10	Y
	B-3856-243	• SCREW, 8-32, FILLISTER HEAD, CRES	5	Y
	B-6735	• CLAMP, LOOP, CUSHIONED	5	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	5	Y
	7931-3E1849-8	• TRANSFLEX TUBING	5	
	3H2017-4	• WIRE HARNESS SUPERSEDES 7931-3E2017-4	5	Y
	7931-3E2017-4	• WIRE HARNESS SUPERSEDED BY 3H2017-4	5	Y
	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	5	Y
	7931-36151	• AMP 36151 PIDG RING TERMINAL SUPERSEDED BY 108318	10	Y
	108318	• TERMINAL, RING SUPERSEDES 7931-36151	10	Y
	7931-4E2511	• SLIP RING ASSEMBLY SUPERSEDED BY 4H2511	1	
	4H2511	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E2511	1	
	B-3384-8H	• BOLT, 1/4-28, HEX HEAD	10	Y
	B-7077-52	• BELLEVILLE SPRING WASHER	10	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	10	Y
	B-3837-0432	• WASHER, CORROSION RESISTANT	10	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-67-245-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-250-2**

AP. Installation Instruction 11AP

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 7E1446 Rev. F

- 1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)

b Hartzell Propeller Service Letter HC-SL-30-259

c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-250-2**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-250-2</b>	<b>PROPELLER DE-ICE KIT INSTALLATION INSTRUCTION 11AP</b>		
	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-3	4	
	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-3	4	
	B-3854-41	• WASHER, LOCK	8	Y
	B-3892-12H	• SCREW, 6-32, FILLISTER HEAD, CRES	8	
	B-6631-3-232	• SCREW, 6-32, FILLISTER HEAD, CRES, ALTERNATE FOR B-3892-12H	8	
	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	4	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
	B-6976-10	• SCREW, 8-32, WASHER HEAD	4	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
	3H2092-3	• WIRE HARNESS SUPERSEDES 7931-3E2092-3	4	Y
	7931-3E2092-3	• WIRE HARNESS SUPERSEDED BY 3H2092-3	4	Y
	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	8	Y
	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	4	Y
	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	8	Y
	4H2444-1	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E2444-1	1	
	7931-4E2444-1	• SLIP RING ASSEMBLY SUPERSEDED BY 4H2444-1	1	
	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	12	Y
	B-7077-52	• BELLEVILLE SPRING WASHER	12	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	12	Y
	B-3837-0432	• WASHER, CORROSION RESISTANT	12	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-67-250-2**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-265-1 and 7931-67-265-2**

AQ. Installation Instruction 11AQ

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

(a) 7E1448 Rev. H

- 1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)

b Hartzell Propeller Service Letter HC-SL-30-259

c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-265-1 and 7931-67-265-2**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-265-1</b>	<b>PROPELLER DE-ICE KIT</b>		
		<b>INSTALLATION INSTRUCTION 11AQ</b>		
	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	4	Y
	<b>7931-67-265-2</b>	<b>PROPELLER DE-ICE KIT</b>		
		<b>INSTALLATION INSTRUCTION 11AQ</b>		
	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-3	4	
	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-3	4	
	B-3854-41	• WASHER, LOCK	8	Y
	B-6631-232	• SCREW, 6-32, FILLISTER HEAD, CRES	8	Y
	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	4	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
	B-6976-10	• SCREW, 8-32, WASHER HEAD	4	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	8	Y
	3H2092-6	• WIRE HARNESS SUPERSEDES 7931-3E2092-6	4	Y
	7931-3E2092-6	• WIRE HARNESS SUPERSEDED BY 3H2092-6	4	Y
	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	16	Y
	4H2448-1	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E2448-1	1	
	7931-4E2448-1	• SLIP RING ASSEMBLY SUPERSEDED BY 4H2448-1	1	
	102831	• BOLT, 1/4-28, HEX HEAD, CRES SUPERSEDES B-3865-15A	4	Y
	B-3865-15A	• BOLT, 1/4-28, HEX HEAD, CRES SUPERSEDED BY 102831	4	Y
	B-3384-26H	• BOLT, 1/4-28, HEX HEAD	8	Y
	B-7076-42	• BELLEVILLE SPRING WASHER	36	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	12	Y
	B-3837-0463	• WASHER, CORROSION RESISTANT	20	Y
	7931-3E2179	• CONNECTOR BRACKET	4	
	B-6658-6	• SCREW, 10-32, FILLISTER HEAD	8	Y
	B-3837-0363	• WASHER, CORROSION RESISTANT	8	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-67-265-1 and 7931-67-265-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-280-2**

AR. Installation Instruction 11AR

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 7E1445 Rev. K

- 1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

- a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)
- b Hartzell Propeller Service Letter HC-SL-30-259
- c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-280-2**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-280-2</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11AR</b>		
	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-3	3	
	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-3	3	
	B-3854-41	• WASHER, LOCK	6	Y
	B-6631-233	• SCREW, 6-32, FILLISTER HEAD, CRES	6	Y
	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	3	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	3	Y
	B-6976-10	• SCREW, 8-32, WASHER HEAD	3	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	3	Y
	3H2092-2	• WIRE HARNESS SUPERSEDES 7931-3E2092-2	3	Y
	7931-3E2092-2	• WIRE HARNESS SUPERSEDED BY 3H2092-2	3	Y
	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	6	Y
	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	3	Y
	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	6	Y
	4H2442-1	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E2442-1	1	
	7931-4E2442-1	• SLIP RING ASSEMBLY SUPERSEDED BY 4H2442-1	1	
	A-2070-10	• SCREW, 1/4-28, BUTTON HEAD	12	Y
	B-7077-52	• BELLEVILLE SPRING WASHER	24	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	12	Y
	B-3837-0432	• WASHER, CORROSION RESISTANT	12	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-67-280-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-315-1 and 7931-67-850-1**

**AS. Installation Instruction 11AS**

- (1) Position the propeller blades at low blade angle or start lock angle.
- (2) Route the terminal end of the wire harness (890) through the hole in counterweight, as shown in Figure AS-1.
- (3) Assemble the plug connection between the wire harness (890) and the de-ice boot.
- (4) Install and tighten the tie strap (900) around the wire harness/de-ice boot plug connection.
- (5) Position the tie strap head (900) in the approximate location shown in Figure AS-1.
- (6) Install the clear vinyl tubing over the wire harness (890) until the clear vinyl tubing contacts the heat shrink tubing installed on the wire harness (890).
- (7) Install the AMP terminals (975) on the lead wires in accordance with the manufacturer's instructions.
- (8) Secure the wire harness/boot connection to the counterweight.
  - (a) Outboard Tie Strap (910) installation:
    - 1 Install tie straps (910) under the tie strap (900), connecting the wire harness/boot plugs, around the counterweight, and over the wire harness (890) as shown in Figure AS-1.
    - 2 Position the tie strap head in the approximate location shown on the side of the counterweight as shown in Figure AS-1. Do not tighten the tie strap (910) at this time.
  - (b) Inboard Tie Strap (910) installation:
    - 1 Install tie straps (910) under the tie strap (900), connecting the wire harness/boot plugs, around the counterweight, and under the wire harness (890) as shown in Figure AS-1.
    - 2 Position the tie strap head in the approximate location shown on the side of the counterweight as shown in Figure AS-1. Do not tighten the tie strap (910) at this time.
  - (c) Verify that the wire harness (890) is taut through the counterweight hole.
  - (d) Tighten all of the tie straps (900 and 910).
- (9) Put the slip ring assembly (1140) on the engine flange.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-315-1 and 7931-67-850-1**

AS. Installation Instruction 11AS - continued

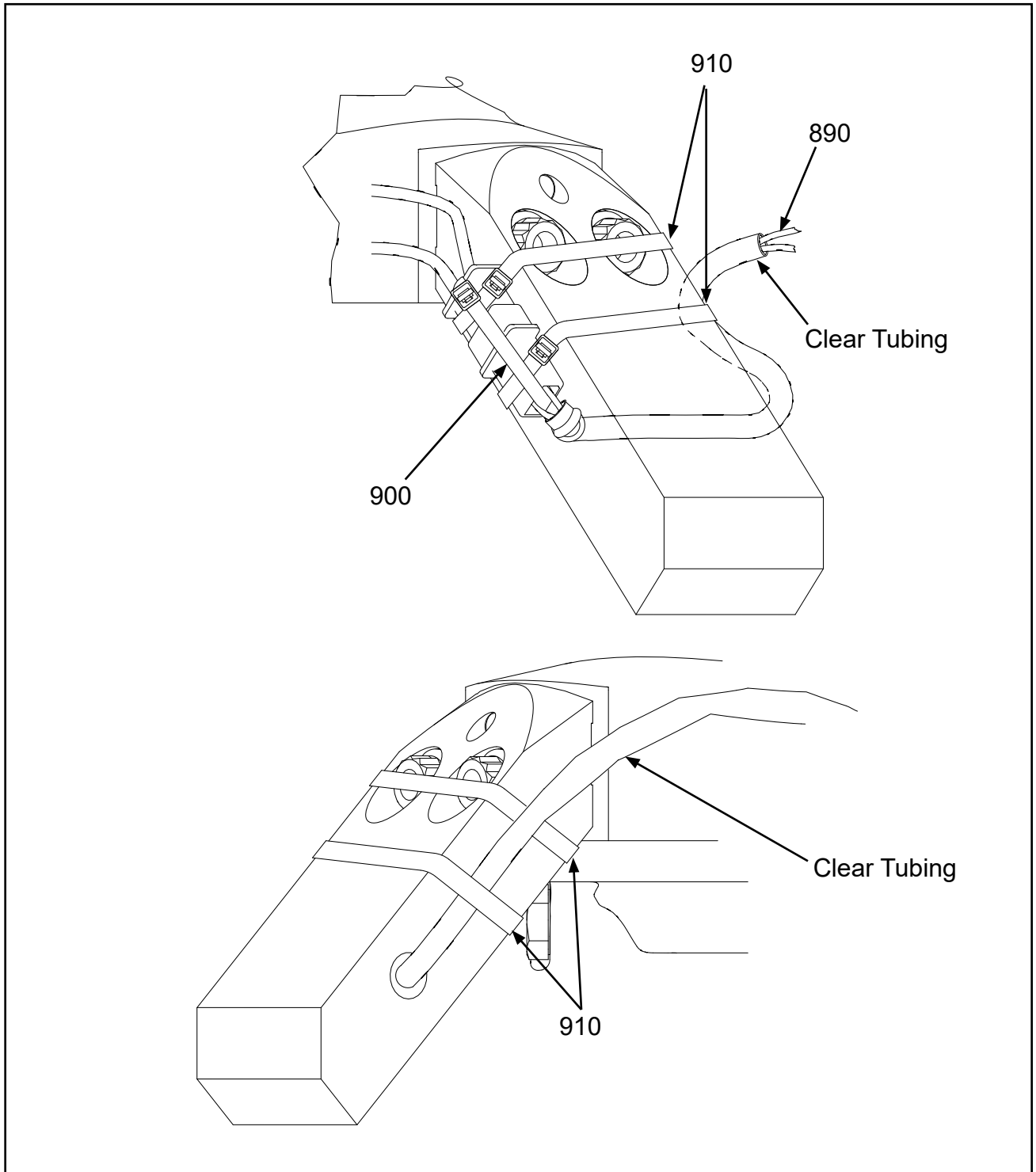
- (10) Using the belleville spring washer (1180), nut (1190), and washer (1210), attach the split mounting plate (1130) to the slip ring assembly (1140) in accordance with Figure AS-2.
- (11) Snug the nut (1190), do not torque at this time.
- (12) Install the propeller on the engine flange in accordance with Hartzell Propeller Owner's Manual 115N (61-00-15).
- (13) Using the existing propeller mounting nuts and washers, attach the split mounting plate (1130) slip ring assembly (1140) to the propeller studs extending through the engine flange in accordance with Figure AS-2.
  - (a) The split between the split mounting plates (1130) must be aligned with the propeller dowel pins.
  - (b) Torque the mounting nuts in accordance with the applicable Hartzell Propeller Owner's Manual 115N (61-00-15).
- (14) Torque the bolts (1350) attaching the slip ring assembly (1140) to the split mounting plates (1130) to 40 - 120 in.-lbs. (4.5 - 14 N•m) to achieve slip ring (1140) run-out in accordance with the Check chapter of this manual.

**CAUTION:** FAILURE TO ROUTE THE HARNESS PROPERLY, MAY PERMIT THE HARNESS TO BE FORCED THROUGH THE SPINNER DOME CUT-OUT.

- (15) Route the wire harness (890) as shown in Figure AS-3.
- (16) Connect the de-ice wire harness (890) and the slip ring lead wires to the bulkhead in accordance with Figure AS-4.
- (17) Torque the nut (300) to 6-8 in. lbs. (0.6-0.9 N•m) and nut (305) 10-12 in. lbs. (1.1-1.3 N•m).
- (18) Using the lead clip (360), screw (350), washer (370) and nut (380), route the de-ice wire harness (890) as shown and attach to the bulkhead in accordance with Figure AS-5 and Figure AS-6.
- (19) Tighten the nut (380) until snug.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

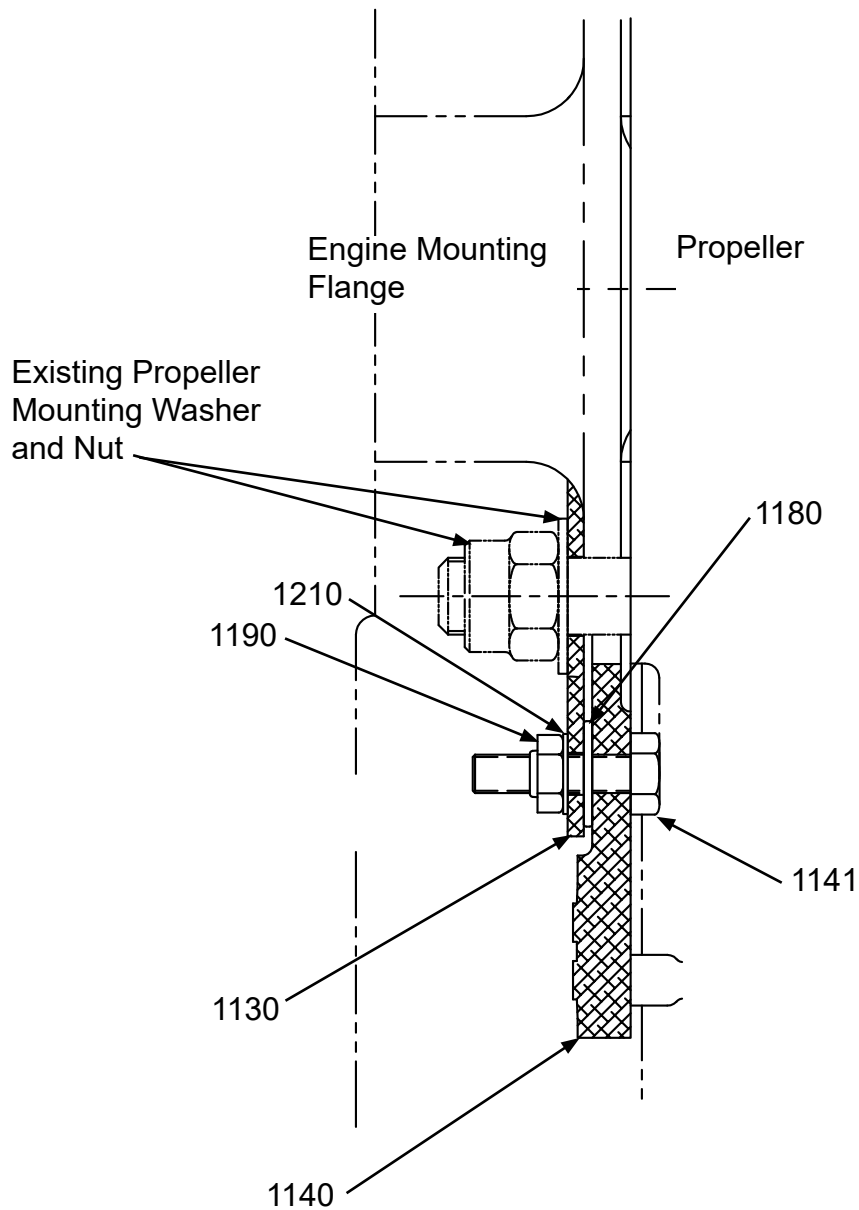
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-315-1 and 7931-67-850-1**



**Wire Harness to Counterweight Attachment  
Figure AS-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-315-1 and 7931-67-850-1**

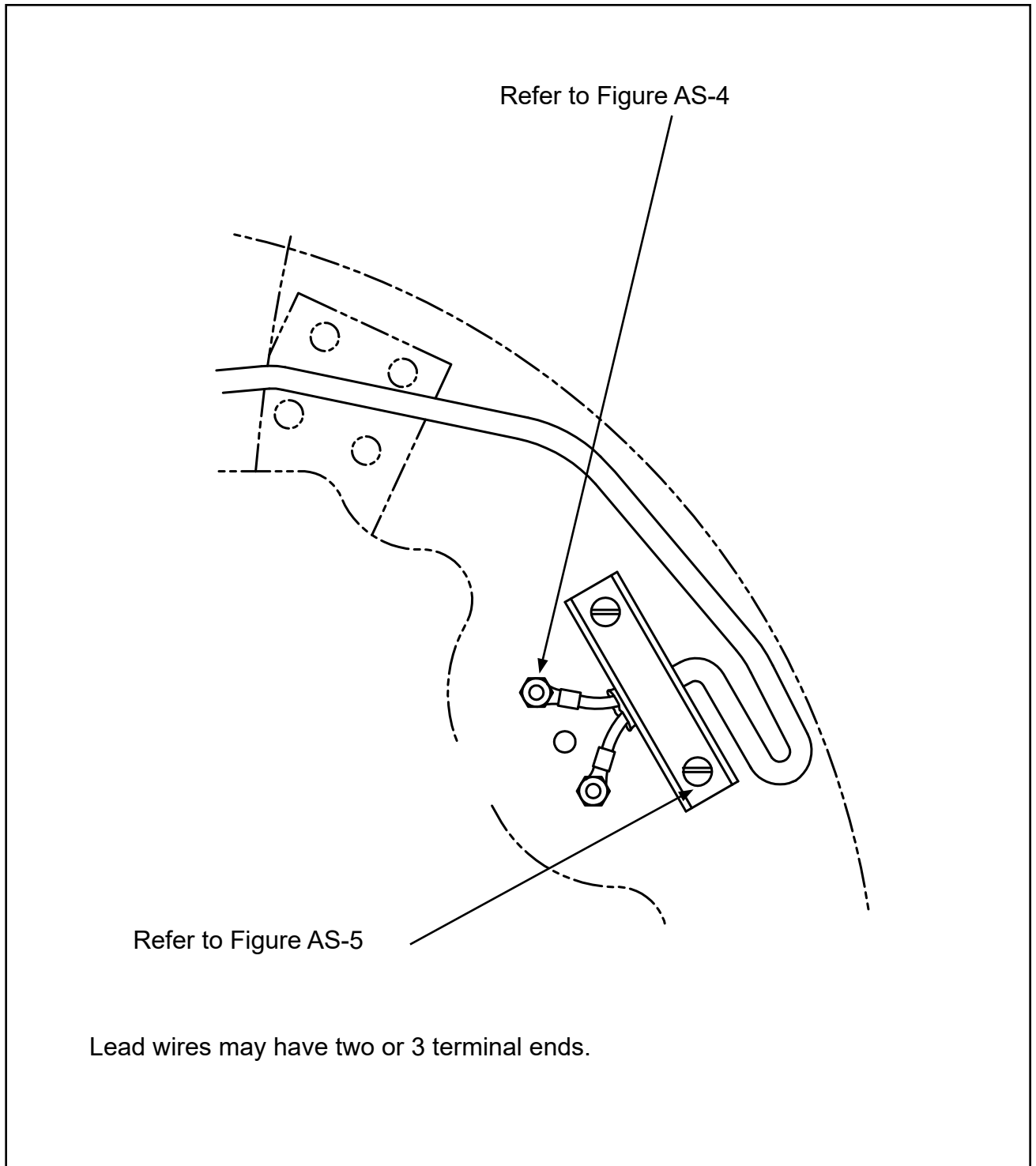


**Slip Ring Mounting  
Figure AS-2**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

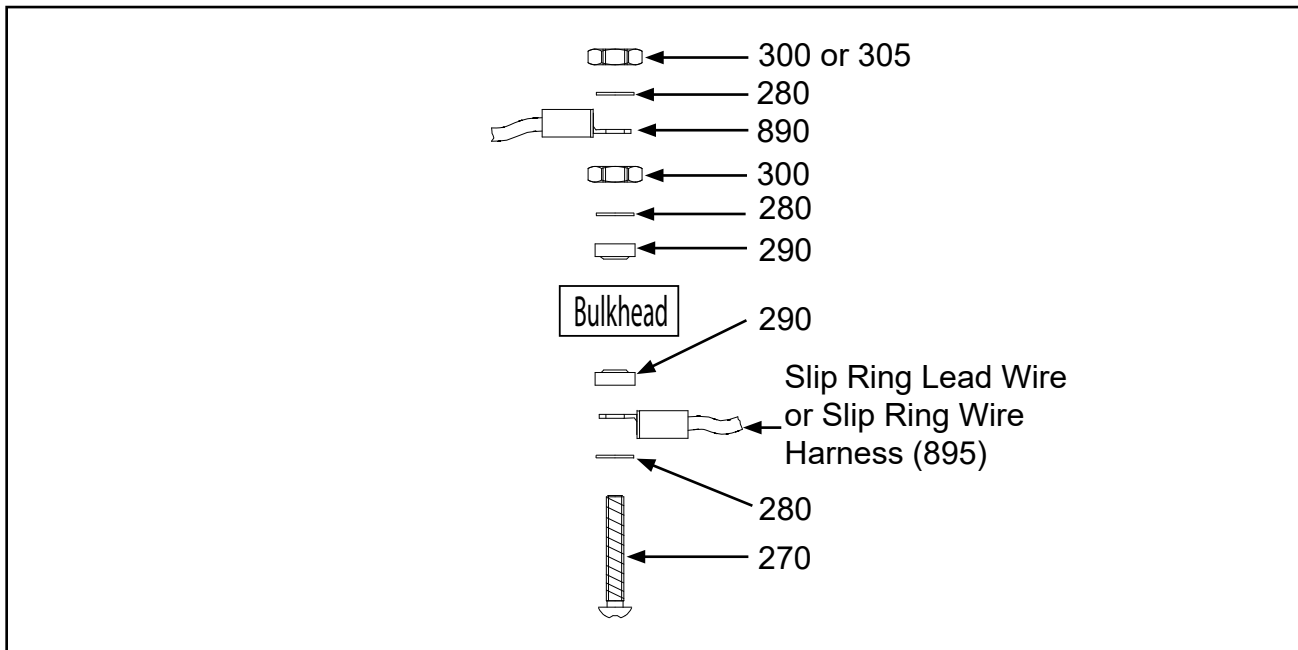
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-315-1 and 7931-67-850-1**



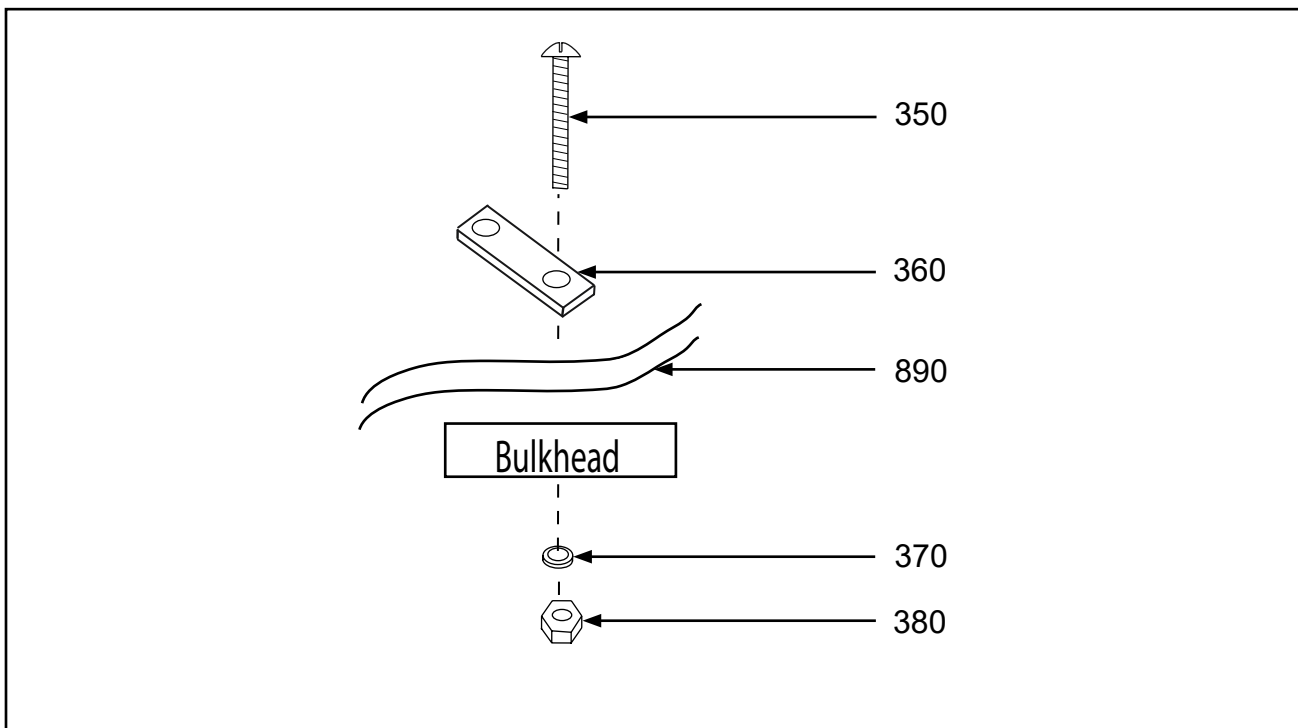
**De-ice Wire Harness Routing  
Figure AS-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-315-1 and 7931-67-850-1**



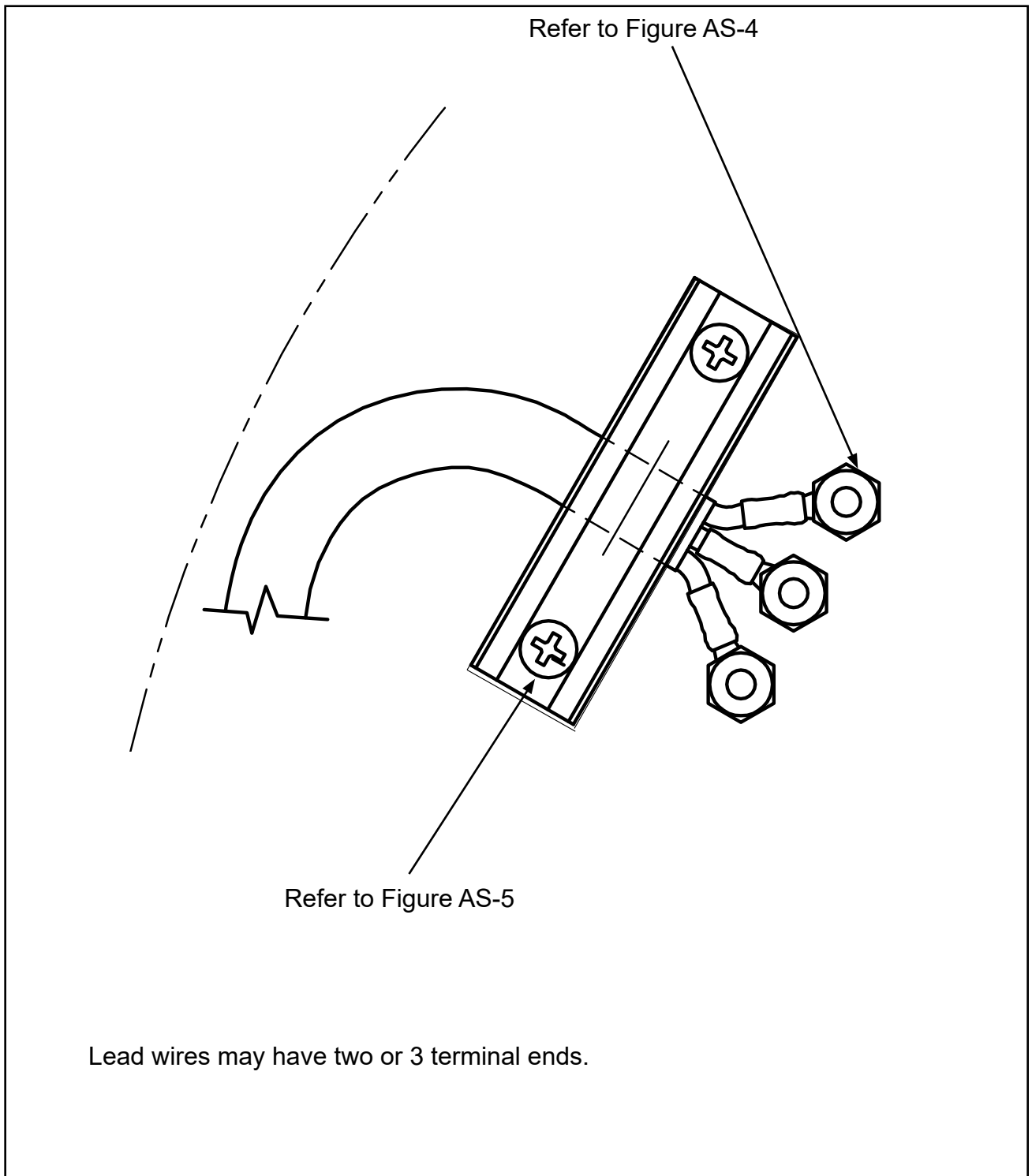
**Securing De-ice Wire Harness and Slip Ring Lead Wire to Bulkhead  
Figure AS-4**



**Lead Clip Attachment to Bulkhead  
Figure AS-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-315-1 and 7931-67-850-1**



**De-ice Wire Harness Routing  
Figure AS-6**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-315-1 and 7931-67-850-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-315-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11AS FIGURES: AS-1 thru AS-6</b>		
270	B-7035-14	• SCREW, 6-32, PAN HEAD, BRASS	6	
280	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	18	Y
290	7931-2E1260	• INSULATING BUSHING SUPERSEDED BY ITEM 290A	12	
290A	2H1260	• INSULATING BUSHING SUPERSEDES ITEM 290	12	
300	B-6641-265	• NUT, HEX, BRASS	12	Y
350	B-6637-30	• SCREW, PAN HEAD, CRES.	6	
360	7931-3E1271-2	• CLIP, LEAD STRAP SUPERSEDED BY ITEM 360A	3	
360A	3H1271-2	• CLIP, LEAD STRAP SUPERSEDES ITEM 360	3	
370	B-3837-N632	• WASHER, CORROSION RESISTANT	6	Y
380	B-6655-06	• NUT, HEX, SELF-LOCKING	6	Y
890	7931-3E2050	• WIRE HARNESS SUPERSEDED BY ITEM 890A	3	Y
890A	3H2050	• WIRE HARNESS SUPERSEDES ITEM 890	3	Y
900	B-3852-1-0	• • STRAP, TIEDOWN, PLASTIC	1	Y
910	B-3852-2-0	• • STRAP, TIEDOWN, PLASTIC	2	Y
975	101902	• • TERMINAL, RING	2	
975A	7931-320619	• • AMP 320619 PIDG RING TERMINAL ALTERNATE FOR ITEM 975	2	
975B	7931-2-320619-1	• • AMP 320619 PIDG RING TERMINAL ALTERNATE FOR ITEM 975	2	
1130	SAE-AMS-I-7444 7931-4E2058	• • CLEAR VINYL TUBING • DE-ICE SPLIT MOUNTING PLATE SUPERSEDED BY ITEM 1130A	2	
1130A	4H3174	• DE-ICE SPLIT MOUNTING PLATE SUPERSEDES ITEM 1130	2	
1140	7931-4E2422	• SLIP RING ASSEMBLY SUPERSEDED BY ITEM 1140A	1	
1140A	4H2422	• SLIP RING ASSEMBLY SUPERSEDES ITEM 1140	1	
1141	102044-4-16	• • SCREW, HEX HEAD, 1/4-28	AR	
1180	B-7077-52	• BELLEVILLE SPRING WASHER	6	Y
1190	B-3808-4	• NUT, HEX, SELF-LOCKING	6	Y
1210	B-3837-0463	• WASHER, CORROSION RESISTANT USED WITH ITEM 1130A ONLY	6	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-67-315-1**

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-315-1 and 7931-67-850-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-850-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11AS FIGURES: AS-1 thru AS-6</b>		
270	B-7035-14	• SCREW, 6-32, PAN HEAD, BRASS	6	
280	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	18	Y
290	7931-2E1260	• INSULATING BUSHING SUPERSEDED BY ITEM 290A	12	
290A	2H1260	• INSULATING BUSHING SUPERSEDES ITEM 290	12	
300	B-6641-265	• NUT, HEX, BRASS	12	Y
350	B-6637-30	• SCREW, PAN HEAD, CRES.	6	
360	7931-3E1271-2	• CLIP, LEAD STRAP SUPERSEDED BY ITEM 360A	3	
360A	3H1271-2	• CLIP, LEAD STRAP SUPERSEDES ITEM 360	3	
370	B-3837-N632	• WASHER, CORROSION RESISTANT	6	Y
380	B-6655-06	• NUT, HEX, SELF-LOCKING	6	Y
890	7931-3E2050	• WIRE HARNESS SUPERSEDED BY ITEM 890A	3	Y
890A	3H2050	• WIRE HARNESS SUPERSEDES ITEM 890	3	Y
900	B-3852-1-0	• • STRAP, TIEDOWN, PLASTIC	1	Y
910	B-3852-2-0	• • STRAP, TIEDOWN, PLASTIC	2	Y
975	101902	• • TERMINAL, RING	2	
975A	7931-320619	• • AMP 320619 PIDG RING TERMINAL ALTERNATE FOR ITEM 975	2	
975B	7931-2-320619-1	• • AMP 320619 PIDG RING TERMINAL ALTERNATE FOR ITEM 975	2	
1130	SAE-AMS-I-7444 7931-4E3174	• • CLEAR VINYL TUBING • DE-ICE SPLIT MOUNTING PLATE SUPERSEDED BY ITEM 1130A	2	
1130A	4H3174	• DE-ICE SPLIT MOUNTING PLATE SUPERSEDES ITEM 1130	2	
1140	7931-4E2422	• SLIP RING ASSEMBLY SUPERSEDED BY ITEM 1140A	1	
1140A	4H2422	• SLIP RING ASSEMBLY SUPERSEDES ITEM 1140	1	
1141	102044-4-16	• • SCREW, HEX HEAD, 1/4-28	AR	
1180	B-7077-52	• BELLEVILLE SPRING WASHER	6	Y
1190	B-3808-4	• NUT, HEX, SELF-LOCKING	6	Y
1210	B-3837-0463	• WASHER, CORROSION RESISTANT	6	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-67-850-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-315-1 and 7931-67-850-1**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-340-5**

AT. Installation Instruction 11AT

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

(a) 7E1492 Rev. U

- 1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)

b Hartzell Propeller Service Letter HC-SL-30-259

c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-340-5**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-340-5</b>	<b>PROPELLER DE-ICE KIT INSTALLATION INSTRUCTION 11AT</b>		
	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-3	4	
	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-3	4	
	B-3854-41	• WASHER, LOCK	8	Y
	B-6631-233	• SCREW, 6-32, FILLISTER HEAD, CRES	8	Y
	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	4	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
	B-6976-10	• SCREW, 8-32, WASHER HEAD	4	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
	3H2092-2	• WIRE HARNESS SUPERSEDES 7931-3E2092-2	4	Y
	7931-3E2092-2	• WIRE HARNESS SUPERSEDED BY 3H2092-2	4	Y
	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	4	Y
	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	8	Y
	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	8	Y
	4H3099-1	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E3099-1	1	
	7931-4E3099-1	• SLIP RING ASSEMBLY SUPERSEDED BY 4H3099-1	1	
	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	12	Y
	B-7077-52	• BELLEVILLE SPRING WASHER	24	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	12	Y
	B-3837-0432	• WASHER, CORROSION RESISTANT	12	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-67-340-5**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-370-1**

AU. Installation Instruction 11AU

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 7E1513 Rev. B

- 1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

- a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)
- b Hartzell Propeller Service Letter HC-SL-30-259
- c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-370-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-370-1</b>	<b>PROPELLER DE-ICE KIT INSTALLATION INSTRUCTION 11AU</b>		
	B-7035-12	• SCREW, 6-32, PAN HEAD, BRASS	6	
	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	18	Y
	7931-2E1260	• INSULATING BUSHING SUPERSEDED BY 2H1260	12	
	2H1260	• INSULATING BUSHING SUPERSEDES 7931-2E1260	12	
	B-6641-265	• NUT, HEX, BRASS	12	Y
	B-6637-230	• SCREW, PAN HEAD, CRES.	6	
	7931-3E1271-2	• CLIP, LEAD STRAP SUPERSEDED BY 3H1271-2	3	
	3H1271-2	• CLIP, LEAD STRAP SUPERSEDES 7931-3E1271-2	3	
	B-3837-N632	• WASHER, CORROSION RESISTANT	12	Y
	B-6655-06	• NUT, HEX, SELF-LOCKING	6	Y
	7931-3E2050	• WIRE HARNESS SUPERSEDED BY 3H2050	3	Y
	3H2050	• WIRE HARNESS SUPERSEDES 7931-3E2050	3	Y
	B-3852-1-0	• • STRAP, TIEDOWN, PLASTIC	1	Y
	B-3852-2-0	• • STRAP, TIEDOWN, PLASTIC	2	Y
	101902	• • TERMINAL, RING	2	
	7931-320619	• • AMP 320619 PIDG RING TERMINAL ALTERNATE FOR 101902	2	
	7931-2-320619-1	• • AMP 320619 PIDG RING TERMINAL ALTERNATE FOR 101902	2	
	SAE-AMS-I-7444	• • CLEAR VINYL TUBING		
	7931-2E1307	• WIRE HARNESS CUSHION SUPERSEDED BY 2H1307	3	Y
	2H1307	• WIRE HARNESS CUSHION SUPERSEDES 7931-2E1307	3	Y
	7931-3E1570	• WIRE HARNESS RUBBER SPACER	3	
	7931-200-M88S	• QS-200-M88S HOSE CLAMP	1	
	7931-3E2196	• WIRE HARNESS, SLIP RING	3	

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-67-370-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-440-1**

**AV .**    Installation Instruction 11AV

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

(a) 7E1559 Rev. H

1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)

b Hartzell Propeller Service Letter HC-SL-30-259

c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-440-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-440-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11AV</b>		
	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-3	3	
	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-3	3	
	B-3854-41	• WASHER, LOCK	6	Y
	B-6631-233	• SCREW, 6-32, FILLISTER HEAD, CRES	6	Y
	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	3	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	3	Y
	B-6976-10	• SCREW, 8-32, WASHER HEAD	3	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	3	Y
	3H2092-2	• DE-ICE WIRE HARNESS SUPERSEDES 7931-3E2092-2	3	Y
	7931-3E2092-2	• DE-ICE WIRE HARNESS SUPERSEDED BY 3H2092-2	3	Y
	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	6	Y
	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	6	Y
	4H2551-1	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E2551-1	1	
	7931-4E2551-1	• SLIP RING ASSEMBLY SUPERSEDED BY 4H2551-1	1	
	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	12	Y
	B-7077-52	• BELLEVILLE SPRING WASHER	24	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	12	Y
	B-3837-0432	• WASHER, CORROSION RESISTANT	12	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	2	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
	7931-3E2259	• SPARK GAP BRACKET SUPERSEDED BY 3H2259A	3	
	3H2259	• BRACKET, SPARKOVER SUPERSEDES 7931-3E2259	3	
	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	3	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-67-440-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-510-3**

**AW. Installation Instruction 11AW**

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 7E1789 Rev. D

- 1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

- a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)
- b Hartzell Propeller Service Letter HC-SL-30-259
- c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-510-3**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-510-3</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11AW</b>		
	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-3	3	
	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-3	3	
	B-3854-41	• WASHER, LOCK	6	Y
	B-6631-232	• SCREW, 6-32, FILLISTER HEAD, CRES	6	Y
	B-6735	• CLAMP, LOOP, CUSHIONED	3	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	3	Y
	B-3866-50	• SCREW, 8-32, 100° HEAD, CRES	3	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	3	Y
	3H2507-1	• DE-ICE WIRE HARNESS SUPERSEDES 7931-3E2507-1	3	Y
	7931-3E2507-1	• DE-ICE WIRE HARNESS SUPERSEDED BY 3H2507-1	3	Y
	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	3	Y
	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	6	Y
	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	6	Y
	7931-4E2714-1	• SLIP RING ASSEMBLY SUPERSEDED BY 4H2714-1	1	
	4H2714-1	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E2714-1	1	
	B-3384-23	• BOLT, 1/4-28, HEX HEAD	6	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	6	Y
	B-3837-0432	• WASHER, CORROSION RESISTANT	18	Y
	B-3837-0463	• WASHER, CORROSION RESISTANT	12	Y
	B-3855-33	• WASHER, LOCK, EXTERNAL TOOTH	6	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-67-510-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-570-1**

**AX.    Installation Instruction 11AX**

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 7E1654 Rev. B

- 1    Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

a    The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)

b    Hartzell Propeller Service Letter HC-SL-30-259

c    Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-570-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-570-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11AX</b>		
	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-3	5	
	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-3	5	
	B-3854-41	• WASHER, LOCK	10	Y
	B-6631-231	• SCREW, 6-32, FILLISTER HEAD, CRES	10	Y
	B-6735	• CLAMP, LOOP, CUSHIONED	5	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	5	Y
	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	5	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	10	Y
	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-3	5	
	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-3	5	
	B-6631-232	• SCREW, 6-32, FILLISTER HEAD, CRES	10	Y
	B-3854-41	• WASHER, LOCK	10	Y
	B-3856-243	• SCREW, 8-32, FILLISTER HEAD, CRES	5	Y
	B-6735	• CLAMP, LOOP, CUSHIONED	5	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	5	Y
	7931-3E1849-8	• TRANSFLEX TUBING, P/N 3E1849-8	5	
	3H2017-4	• WIRE HARNESS SUPERSEDES 7931-3E2017-4	5	Y
	7931-3E2017-4	• WIRE HARNESS SUPERSEDED BY 3H2017-4	5	Y
	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	5	Y
	7931-36151	• AMP 36151 PIDG RING TERMINAL SUPERSEDED BY 108318	10	Y
	108318	• TERMINAL, RING SUPERSEDES 7931-36151	10	Y
	4H2511	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E2511	1	
	7931-4E2511	• SLIP RING ASSEMBLY SUPERSEDED BY 4H2511	1	
	B-3384-7H	• BOLT, 1/4-28, HEX HEAD	10	Y
	B-7077-52	• BELLEVILLE SPRING WASHER	10	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	10	Y
	B-3837-0432	• WASHER, CORROSION RESISTANT	10	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-67-570-1**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-585-1**

AY . Installation Instruction 11AY

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 7E1676 Rev. F

1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)

b Hartzell Propeller Service Letter HC-SL-30-259

c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-585-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-585-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11AY</b>		
	B-7035-14	• SCREW, 6-32, PAN HEAD, BRASS	4	
	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	12	Y
	2H1260	• INSULATING BUSHING SUPERSEDES 7931-2E1260	8	
	7931-2E1260	• INSULATING BUSHING SUPERSEDED BY 2H1260	8	
	B-6641-265	• NUT, HEX, BRASS	8	Y
	B-6637-30	• SCREW, PAN HEAD, CRES.	4	
	3H1271-2	• CLIP, LEAD STRAP SUPERSEDES 7931-3E1271-2	2	
	7931-3E1271-2	• CLIP, LEAD STRAP SUPERSEDED BY 3H1271-2	2	
	B-3837-N632	• WASHER, CORROSION RESISTANT	8	Y
	B-6655-06	• NUT, HEX, SELF-LOCKING	4	Y
	3H2356-1	• DE-ICE WIRE HARNESS, SLIP RING SUPERSEDES 7931-3E2356-1	3	
	7931-3E2356-1	• DE-ICE WIRE HARNESS, SLIP RING SUPERSEDED BY 3H2356-1	3	
	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	2	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-67-585-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-595-1**

AZ. Installation Instruction 11AZ

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 7E1678 Rev. G

- 1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

- a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)
- b Hartzell Propeller Service Letter HC-SL-30-259
- c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-595-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-595-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11AZ</b>		
	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-2	4	
	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-2	4	
	B-6655-06	• NUT, HEX, SELF-LOCKING	8	Y
	B-3854-41	• WASHER, LOCK	8	Y
	B-3837-N616	• WASHER, CORROSION RESISTANT	8	Y
	B-6637-34	• SCREW, PAN HEAD, CRES	8	Y
	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	4	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
	B-3856-247	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-2	4	
	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-2	4	
	B-6631-231	• SCREW, 6-32, FILLISTER HEAD, CRES	8	Y
	B-3854-41	• WASHER, LOCK	8	Y
	B-3856-243	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
	B-3854-42	• WASHER, LOCK	4	Y
	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	4	Y
	7931-3E2017-9	• DE-ICE WIRE HARNESS	4	Y
	7931-4E2661-1	• SLIP RING ASSEMBLY SUPERSEDED BY 4H2661-1	1	
	4H2661-1	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E2661-1	1	
	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	8	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-67-595-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-610-1**

**BA. Installation Instruction 11BA**

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 7E1731 Rev. D

- 1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

- a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)
- b Hartzell Propeller Service Letter HC-SL-30-259
- c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-610-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-610-1</b>	<b>PROPELLER DE-ICE KIT INSTALLATION INSTRUCTION 11BA</b>		
	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-3	3	
	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-3	3	
	B-3854-41	• WASHER, LOCK	6	Y
	B-6631-233	• SCREW, 6-32, FILLISTER HEAD, CRES	6	Y
	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	3	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	3	Y
	B-6976-10	• SCREW, 8-32, WASHER HEAD	3	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	3	Y
	3H2092-2	• WIRE HARNESS SUPERSEDES 7931-3E2092-2	3	Y
	7931-3E2092-2	• WIRE HARNESS SUPERSEDED BY 3H2092-2	3	Y
	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	6	Y
	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	3	Y
	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	6	Y
	4H2442-1	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E2442-1	1	
	7931-4E2442-1	• SLIP RING ASSEMBLY SUPERSEDED BY 4H2442-1	1	
	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	12	Y
	B-7077-52	• BELLEVILLE SPRING WASHER	12	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	12	Y
	B-3837-0432	• WASHER, CORROSION RESISTANT	12	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-67-610-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-625-1**

**BB. Installation Instruction 11BB**

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 7E1701 Rev. L

- 1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

- a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)
- b Hartzell Propeller Service Letter HC-SL-30-259
- c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-625-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-625-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11BB</b>		
	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-3	5	
	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-3	5	
	B-3854-41	• WASHER, LOCK	10	Y
	B-6631-231	• SCREW, 6-32, FILLISTER HEAD, CRES	10	Y
	B-6735	• CLAMP, LOOP, CUSHIONED	5	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	5	Y
	B-3856-247	• SCREW, 8-32, FILLISTER HEAD, CRES	5	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	5	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	5	Y
	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-3	5	
	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-3	5	
	B-6631-233	• SCREW, 6-32, FILLISTER HEAD, CRES	10	Y
	B-3854-41	• WASHER, LOCK	10	Y
	B-3856-243	• SCREW, 8-32, FILLISTER HEAD, CRES	5	Y
	B-6735	• CLAMP, LOOP, CUSHIONED	5	Y
	B-3854-42	• WASHER, LOCK	5	Y
	7931-3E1849-8	• TRANSFLEX TUBING, P/N 3E1849-8	5	
	3H2017-10	• WIRE HARNESS SUPERSEDES 7931-3E2017-10	5	Y
	7931-3E2017-10	• WIRE HARNESS SUPERSEDED BY 3H2017-10	5	Y
	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	5	Y
	7931-36151	• AMP 36151 PIDG RING TERMINAL SUPERSEDED BY 108318	10	Y
	108318	• TERMINAL, RING SUPERSEDES 7931-36151	10	Y
	4H2863	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E2863	1	
	7931-4E2863	• SLIP RING ASSEMBLY SUPERSEDED BY 4H2863	1	
	B-3874-10A	• BOLT, 1/4-28, HEX HEAD	10	Y
	B-7077-52	• BELLEVILLE SPRING WASHER	10	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	10	Y
	B-3837-0432	• WASHER, CORROSION RESISTANT	10	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-67-625-1**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-680-(5,6)**

**BC.    Installation Instruction 11BC**

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

(a) 7E1744 Rev. W

1    Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

a    The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)

b    Hartzell Propeller Service Letter HC-SL-30-259

c    Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-680-(5,6)**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-680-5</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11BC</b>		
	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-3	4	
	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-3	4	
	B-6655-06	• NUT, HEX, SELF-LOCKING	8	Y
	B-3854-41	• WASHER, LOCK	8	Y
	B-3837-N616	• WASHER, CORROSION RESISTANT	8	Y
	B-6631-232	• SCREW, 6-32, FILLISTER HEAD, CRES	8	Y
	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-3	4	
	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-3	4	
	B-3854-41	• WASHER, LOCK	8	Y
	B-6631-231	• SCREW, 6-32, FILLISTER HEAD, CRES	8	Y
	7931-2E1852-3	• TERMINAL STRIP SPACER SUPERSEDED BY 2H1852-3	4	
	2H1852-3	• TERMINAL STRIP SPACER SUPERSEDES 7931-2E1852-3	4	
	B-3855-31	• WASHER, LOCK, EXTERNAL TOOTH	4	Y
	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
	B-3854-42	• WASHER, LOCK	4	Y
	B-3853-F4	• CLAMP, LOOP, PLASTIC	4	Y
	B-6583-0437	• SPRING PIN, 3/32	4	Y
	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	8	Y
	7931-3E2526-1	• DE-ICE WIRE HARNESS SUPERSEDED BY 3H2526-1	4	Y
	3H2526-1	• DE-ICE WIRE HARNESS SUPERSEDES 7931-3E2526-1	4	Y
	7931-4E3094-1	• SLIP RING ASSEMBLY SUPERSEDED BY 4H3094-1	1	
	4H3094-1	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E3094-1	1	
	A-2070-10	• SCREW, 1/4-28, BUTTON HEAD	8	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
	B-6265	• BRACKET, WIRE HARNESS	4	

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-67-680-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-680-(5,6)**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-680-6</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11BC</b>		
	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-3	4	
	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-3	4	
	B-6655-06	• NUT, HEX, SELF-LOCKING	8	Y
	B-3854-41	• WASHER, LOCK	8	Y
	B-3837-N616	• WASHER, CORROSION RESISTANT	8	Y
	B-6631-232	• SCREW, 6-32, FILLISTER HEAD, CRES	8	Y
	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-3	4	
	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-3	4	
	B-3854-41	• WASHER, LOCK	8	Y
	B-6631-231	• SCREW, 6-32, FILLISTER HEAD, CRES	8	Y
	7931-2E1852-3	• TERMINAL STRIP SPACER SUPERSEDED BY 2H1852-3	4	
	2H1852-3	• TERMINAL STRIP SPACER SUPERSEDES 7931-2E1852-3	4	
	B-3855-31	• WASHER, LOCK, EXTERNAL TOOTH	4	Y
	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
	B-3854-42	• WASHER, LOCK	4	Y
	B-3853-F4	• CLAMP, LOOP, PLASTIC	4	Y
	B-6583-0437	• SPRING PIN, 3/32	4	Y
	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	8	Y
	7931-3E2526-1	• DE-ICE WIRE HARNESS SUPERSEDED BY 3H2526-1	4	Y
	3H2526-1	• DE-ICE WIRE HARNESS SUPERSEDES 7931-3E2526-1	4	Y
	7931-4E3094-1	• SLIP RING ASSEMBLY SUPERSEDED BY 4H3094-1	1	
	4H3094-1	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E3094-1	1	
	A-2070-10	• SCREW, 1/4-28, BUTTON HEAD	8	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
	B-6265	• BRACKET, WIRE HARNESS	4	

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-67-680-6**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-680-(5,6)**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-740-1**

**BD.    Installation Instruction 11BD**

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 7E1755 Rev. F

- 1    Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

a    The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)

b    Hartzell Propeller Service Letter HC-SL-30-259

c    Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-740-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-740-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11BD</b>		
	7931-24693C-31	• MS24693C-31 FLAT HEAD SCREW	10	Y
	7931-35790-1	• MS35790-1 STEEL LOCK WASHER	10	Y
	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-2	5	
	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-2	5	
	7931-2E1365	• TAPPED EYELET SUPERSEDED BY 2H1365	10	Y
	2H1365	• TAPPED EYELET SUPERSEDES 7931-2E1365	10	Y
	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-3	5	
	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-3	5	
	B-6631-231	• SCREW, 6-32, FILLISTER HEAD, CRES	10	Y
	B-3854-41	• WASHER, LOCK	20	Y
	7931-2E1852-3	• TERMINAL STRIP SPACER SUPERSEDED BY 2H1852-3	5	
	2H1852-3	• TERMINAL STRIP SPACER SUPERSEDES 7931-2E1852-3	5	
	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	5	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	5	Y
	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	5	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	5	Y
	B-3856-243	• SCREW, 8-32, FILLISTER HEAD, CRES	5	Y
	B-3854-42	• WASHER, LOCK	5	Y
	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	5	Y
	7931-3E2493-1	• DE-ICE WIRE HARNESS, THREE PHASE AC SUPERSEDED BY 3H2493-1	5	Y
	3H2493-1	• DE-ICE WIRE HARNESS, THREE PHASE AC SUPERSEDES 7931-3E2493-1	5	Y
	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	10	Y
	7931-4E3000-1	• SLIP RING ASSEMBLY SUPERSEDED BY 4H3000-1	1	
	4H3000-1	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E3000-1	1	
	A-2070-10	• SCREW, 1/4-28, BUTTON HEAD	10	Y
	7931-3E2508-1	• SPARK GAP BRACKET	5	

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-67-740-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-750-1**

**BE.    Installation Instruction 11BE**

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 7E1761 Rev. C

- 1    Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

- a    The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)
- b    Hartzell Propeller Service Letter HC-SL-30-259
- c    Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-750-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-750-1</b>	<b>PROPELLER DE-ICE KIT INSTALLATION INSTRUCTION 11BE</b>		
	B-6655-06	• NUT, HEX, SELF-LOCKING	6	Y
	B-7035-14	• SCREW, 6-32, PAN HEAD, BRASS	6	
	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	18	
	2H1260	• INSULATING BUSHING SUPERSEDES 7931-2E1260	18	
	7931-2E1260	• INSULATING BUSHING SUPERSEDED BY 2H1260	18	
	B-6641-265	• NUT, HEX, BRASS	12	
	B-6637-30	• SCREW, PAN HEAD, CRES.	6	
	3H1271-2	• CLIP, LEAD STRAP SUPERSEDES 7931-3E1271-2	3	
	7931-3E1271-2	• CLIP, LEAD STRAP SUPERSEDED BY 3H1271-2	3	
	B-3837-N632	• WASHER, CORROSION RESISTANT	12	Y
	2H1307	• WIRE HARNESS CUSHION SUPERSEDES 7931-2E1307	6	
	7931-2E1307	• WIRE HARNESS CUSHION SUPERSEDED BY 2H1307	6	
	3H1794	• WIRE HARNESS RUBBER SPACER SUPERSEDES 7931-3E1794	6	
	7931-3E1794	• WIRE HARNESS RUBBER SPACER SUPERSEDED BY 3H1794	6	
	7931-200-M80S	• QS-200-M80S HOSE CLAMP	2	
	2H1291	• DE-ICE RESTAINER STRAP SUPERSEDES 7931-2E1291	3	Y
	7931-2E1291	• DE-ICE RESTAINER STRAP SUPERSEDED BY 2H1291	3	Y
	3H2292-2	• WIRE HARNESS, SLIP RING SUPERSEDES 7931-3E2292-2	3	Y
	7931-3E2292-2	• WIRE HARNESS, SLIP RING SUPERSEDED BY 3H2292-2	3	Y
	4H2200-3	• DE-ICE BOOT	3	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-67-750-1**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-760-1**

**BF.    Installation Instruction 11BF**

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 7E1764 Rev. F

- 1    Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

- a    The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)
- b    Hartzell Propeller Service Letter HC-SL-30-259
- c    Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-760-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-760-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11BF</b>		
	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-3	5	
	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-3	5	
	B-3854-41	• WASHER, LOCK	10	Y
	B-6631-233	• SCREW, 6-32, FILLISTER HEAD, CRES	10	Y
	B-6735	• CLAMP, LOOP, CUSHIONED	5	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	5	Y
	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	5	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	10	Y
	3H2092-2	• WIRE HARNESS SUPERSEDES 7931-3E2092-2	5	Y
	7931-3E2092-2	• WIRE HARNESS SUPERSEDED BY 3H2092-2	5	Y
	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	15	Y
	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	10	Y
	4H2511	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E2511	1	
	7931-4E2511	• SLIP RING ASSEMBLY SUPERSEDED BY 4H2511	1	
	B-3384-8H	• BOLT, 1/4-28, HEX HEAD	10	Y
	B-7077-52	• BELLEVILLE SPRING WASHER	10	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	10	Y
	B-3837-0432	• WASHER, CORROSION RESISTANT	10	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-67-760-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-805-1**

**BG. Installation Instruction 11BG**

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 7E1772 Rev. B

- 1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

- a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)
- b Hartzell Propeller Service Letter HC-SL-30-259
- c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-805-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-805-1</b>	<b>PROPELLER DE-ICE KIT INSTALLATION INSTRUCTION BG</b>		
	B-7035-14	• SCREW, 6-32, PAN HEAD, BRASS	9	
	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	27	Y
	2H1260	• INSULATING BUSHING SUPERSEDES 7931-2E1260	18	
	7931-2E1260	• INSULATING BUSHING SUPERSEDED BY 2H1260	18	
	B-6641-265	• NUT, HEX, BRASS	18	Y
	B-6637-30	• SCREW, PAN HEAD, CRES.	6	
	3H1271-2	• CLIP, LEAD STRAP SUPERSEDES 7931-3E1271-2	3	
	7931-3E1271-2	• CLIP, LEAD STRAP SUPERSEDED BY 3H1271-2	3	
	B-3837-N632	• WASHER, CORROSION RESISTANT	12	Y
	B-6655-06	• NUT, HEX, SELF-LOCKING	6	Y
	2H1307	• WIRE HARNESS CUSHION SUPERSEDES 7931-2E1307	6	
	7931-2E1307	• WIRE HARNESS CUSHION SUPERSEDED BY 2H1307	6	
	3H1794	• WIRE HARNESS RUBBER SPACER SUPERSEDES 7931-3E1794	6	
	7931-3E1794	• WIRE HARNESS RUBBER SPACER SUPERSEDED BY 3H1794	6	
	7931-200-M80S	• QS-200-M80S HOSE CLAMP	2	
	2H1291	• DE-ICE RESTAINER STRAP SUPERSEDES 7931-2E1291	3	Y
	7931-2E1291	• DE-ICE RESTAINER STRAP SUPERSEDED BY 2H1291	3	Y
	3H2182	• DE-ICE WIRE HARNESS, SLIP RING SUPERSEDES 7931-3E2182	3	
	7931-3E2182	• DE-ICE WIRE HARNESS, SLIP RING SUPERSEDED BY 3H2182	3	

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-67-805-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-825-1**

**BH.    Installation Instruction 11BH**

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 7E1778 Rev. G

- 1    Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

- a    The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)
- b    Hartzell Propeller Service Letter HC-SL-30-259
- c    Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-825-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-825-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11BH</b>		
	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-2	5	
	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-2	5	
	B-6655-06	• NUT, HEX, SELF-LOCKING	10	Y
	B-3854-41	• WASHER, LOCK	20	Y
	B-6631-231	• SCREW, 6-32, FILLISTER HEAD, CRES	10	Y
	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	5	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	5	Y
	B-3856-248	• SCREW, 8-32, FILLISTER HEAD, CRES	5	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	5	Y
	B-3854-42	• WASHER, LOCK	5	Y
	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-3	5	
	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-3	5	
	B-6631-233	• SCREW, 6-32, FILLISTER HEAD, CRES	10	Y
	B-3854-41	• WASHER, LOCK	10	Y
	B-3856-243	• SCREW, 8-32, FILLISTER HEAD, CRES	5	Y
	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	5	Y
	B-3854-42	• WASHER, LOCK	5	Y
	4H1889-10	• DE-ICE WIRE HARNESS SUPERSEDES 7931-4E1889-10	5	Y
	7931-4E1889-10	• DE-ICE WIRE HARNESS SUPERSEDED BY 4H1889-10	5	Y
	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	5	Y
	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	5	Y
	4H3062-1	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E3062-1	1	
	7931-4E3062-1	• SLIP RING ASSEMBLY SUPERSEDED BY 4H3062-1	1	
	B-3384-21H	• BOLT, 1/4-28, HEX HEAD	5	Y
	B-3384-16H	• BOLT, 1/4-28, HEX HEAD	5	Y
	B-7077-52	• BELLEVILLE SPRING WASHER	10	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	10	Y
	B-3851-0463	• WASHER	10	Y
	B-3837-N616	• WASHER, CORROSION RESISTANT	10	Y
	B-3854-43	• WASHER, LOCK	2	
	B-3840-12	• SCREW, 10-32, FILLISTER HEAD	2	Y
	7931-3E2536-1	• BRACKET, SYNCHROPHASER TARGET SUPERSEDED BY 3H2536-1	1	
	3H2536-1	• BRACKET, SYNCHROPHASER TARGET SUPERSEDES 7931-3E2536-1	1	
	B-3808-3	• NUT, HEX, SELF-LOCKING	2	Y
	B-3837-0332	• WASHER, CORROSION RESISTANT	2	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-67-825-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-830-1**

**BI.    Installation Instruction BI**

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 7E1780 Rev. B

- 1    Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

- a    The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)
- b    Hartzell Propeller Service Letter HC-SL-30-259
- c    Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-830-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-830-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11BI</b>		
	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-3	3	
	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-3	3	
	B-3854-41	• WASHER, LOCK	6	Y
	B-6631-232	• SCREW, 6-32, FILLISTER HEAD, CRES	6	Y
	B-6735	• CLAMP, LOOP, CUSHIONED	3	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	3	Y
	B-3866-50	• SCREW, 8-32, 100° HEAD, CRES	3	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	3	Y
	3H2507-1	• DE-ICE WIRE HARNESS SUPERSEDES 7931-3E2507-1	3	Y
	7931-3E2507-1	• DE-ICE WIRE HARNESS SUPERSEDED BY 3H2507-1	3	Y
	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	3	Y
	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	6	Y
	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	6	Y
	4H2714-1	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E2714-1	1	
	7931-4E2714-1	• SLIP RING ASSEMBLY SUPERSEDED BY 4H2714-1	1	
	B-3384-23	• BOLT, 1/4-28, HEX HEAD	6	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	6	Y
	B-3837-0432	• WASHER, CORROSION RESISTANT	18	Y
	B-3837-0463	• WASHER, CORROSION RESISTANT	12	Y
	B-3855-33	• WASHER, LOCK, EXTERNAL TOOTH	6	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-67-830-1**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-840-1 and 103616**

**BJ.**    Installation Instruction 11BJ

- (1) Using the bolts (1160), Belleville spring washers (1180), washers (1200), and nuts (1190), attach the slip ring (1140) to the spinner split mounting plate as shown in Figure BJ-1.
- (2) Torque the bolts (1160) to 40-120 In. Lbs. (4.51-13.55 N•m).
- (3) Perform slip ring run-out check in accordance with the Check chapter of this manual.
- (4) Using screw (220) and washer (200), orient the terminal strip as shown in Figure 10D-2 and attach the terminal strip (170) to the bulkhead in accordance with the applicable configuration shown in Figure BJ-3.
  - (a) For de-ice kit 7931-67-840-1 use Configuration A.
  - (b) For de-ice kit 103616 use Configuration B.
- (5) Tighten the screws (220) until snug.
- (6) Position the propeller blades at reverse blade angle.
- (7) Using screw (320) and washer (330), attach the terminal strip (310) to the counterweight. Refer to Figure BJ-4 and Figure BJ-6.
- (8) Torque the screws to 10-12 in. lb. (1.12-1.35 N•m).
- (9) Route the de-ice boot lead wires around the counterweight, as shown in Figure BJ-6.
- (10) Install the de-ice boot lead wires and de-ice wire harness lead wires (890) to the terminal strip (310) in accordance with Figure BJ-6.
- (11) Tighten the terminal screws until snug.
- (12) Using one tie strap (940) secure the de-ice boot lead wire to the counterweight as shown in Figure BJ-6. Position the tie strap head as shown.
- (13) Install the tie strap (930) around the blade and over the de-ice boot lead wires as shown in Figure BJ-6.
- (14) Install the clamp (660), around the wire harness (890) as shown in Figure BJ-5.
- (15) Using screw (650) and washer (665), install the clamp (660) to the counterweight in accordance with Figure BJ-5 and Figure BJ-6.
- (16) Orient the centerline of the clamp perpendicular to the blade as shown in Figure BJ-6.
- (17) Torque the screw (650) to 22-25 in. lb. (2.48-2.82 N•m).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

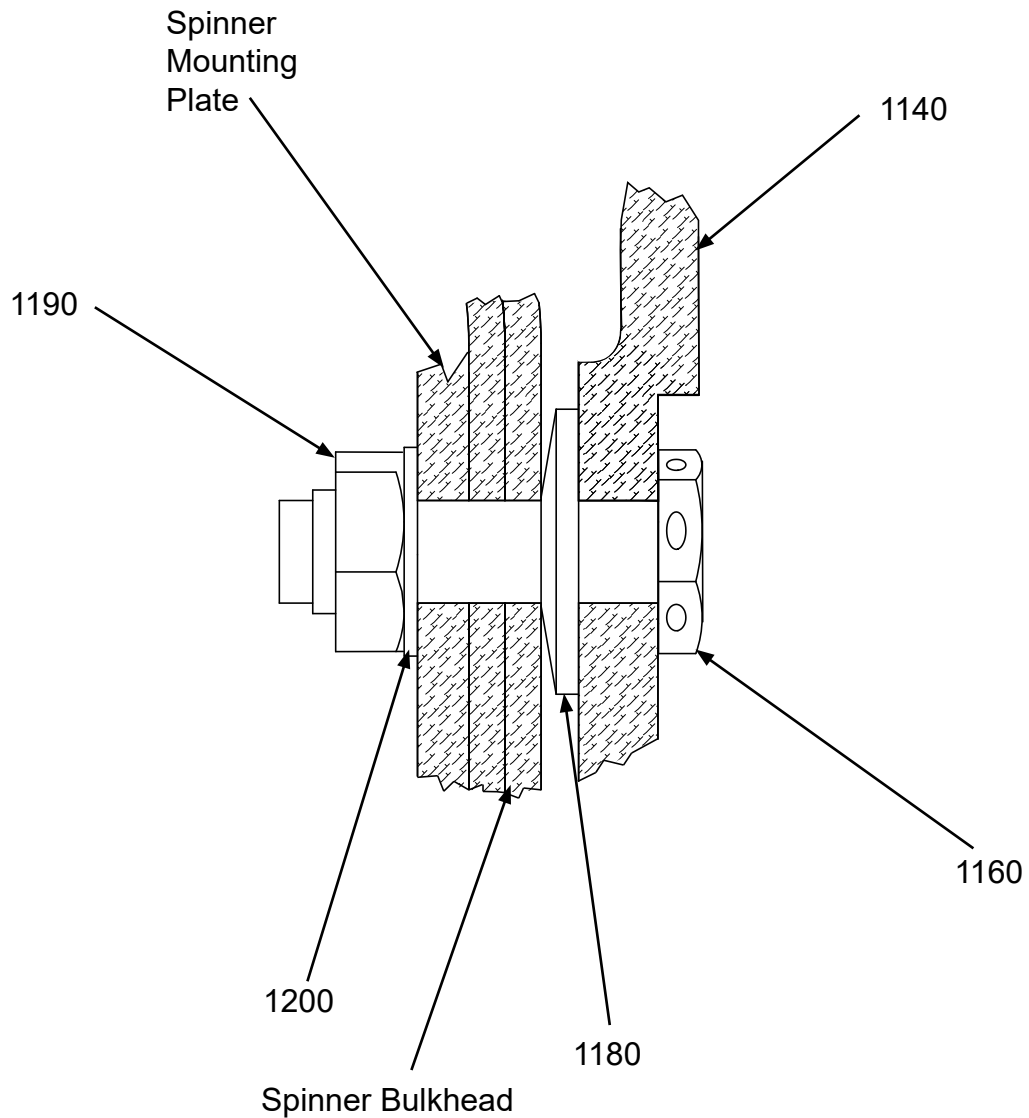
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-840-1 and 103616**

**BJ.**    Installation Instruction 11BJ - continued

- (18) Install the slip ring terminals and de-ice wire harness (890) to the bulkhead terminal strip (170) in accordance with Figure BJ-7, typical three wire installation.
- (19) Tighten the terminal screws until snug.
- (20) Install the clamp (500), around the wire harness (890) as shown in Figure BJ-2.
- (21) Using screw (610) and washers (620 and 630), install the clamp (500) to the bulkhead in accordance with Figure BJ-8 and Figure BJ-2.
- (22) Orient the centerline of the clamp to the terminal strip (170) as shown in Figure BJ-2.
- (23) Cycle the propeller from low angle to high angle to verify proper wire harness (890) installation. Make sure the wire harness is not obstructed during cycling.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-840-1 and 103616**

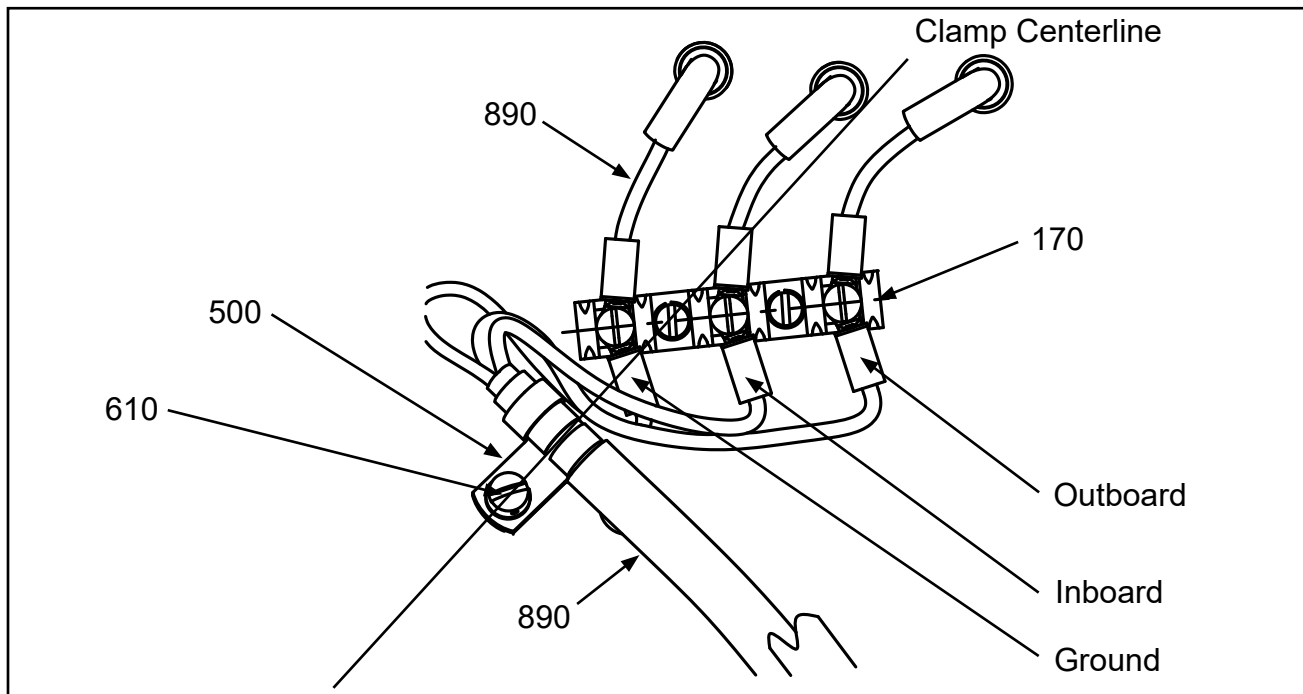


**Slip Ring Mounting  
Figure BJ-1**

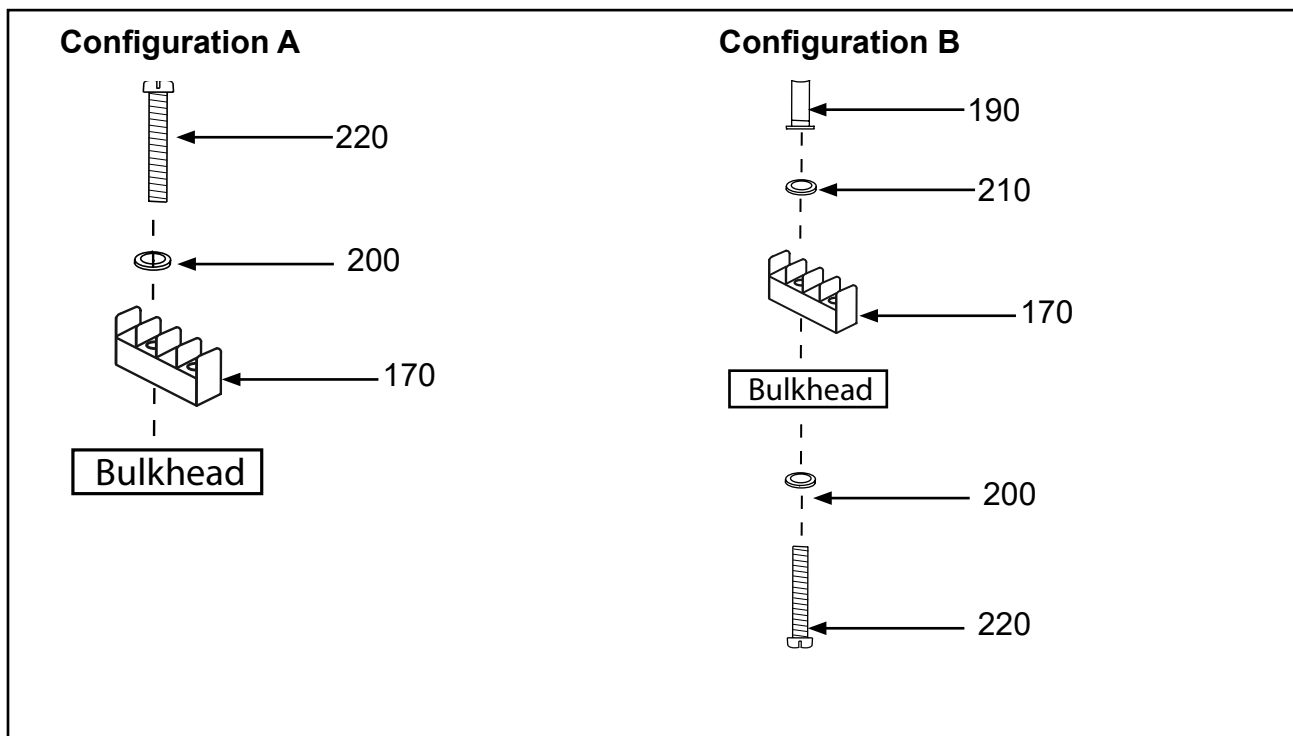
**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-840-1 and 103616**



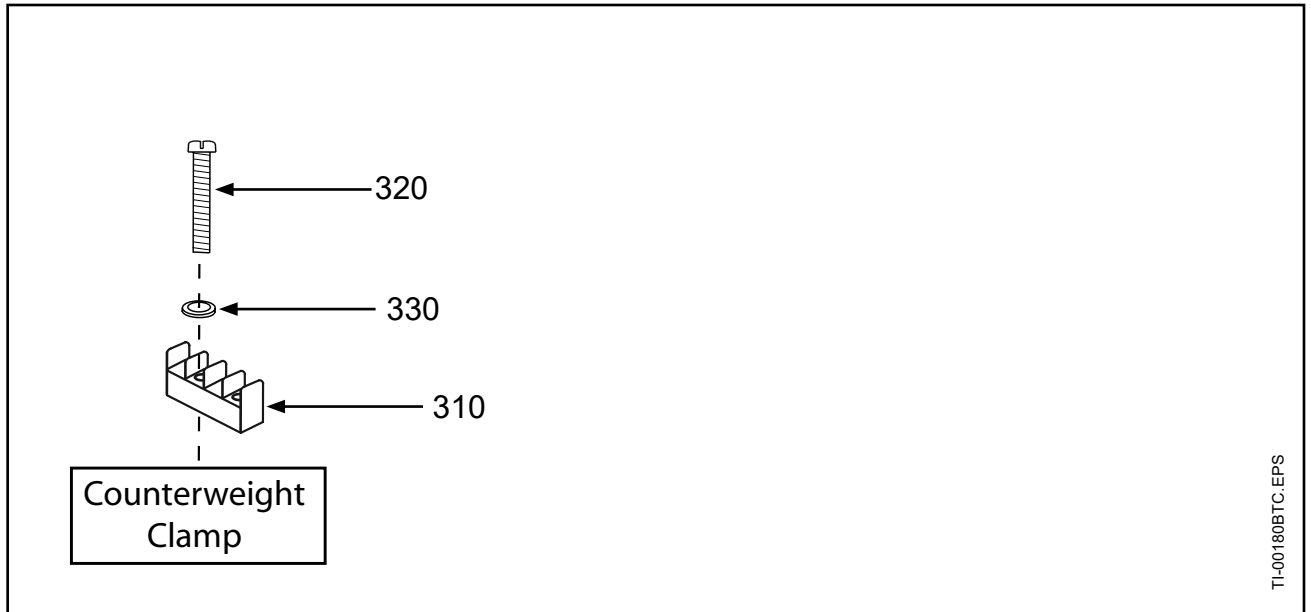
**Terminal Strip to Bulkhead Attachment  
Figure BJ-2**



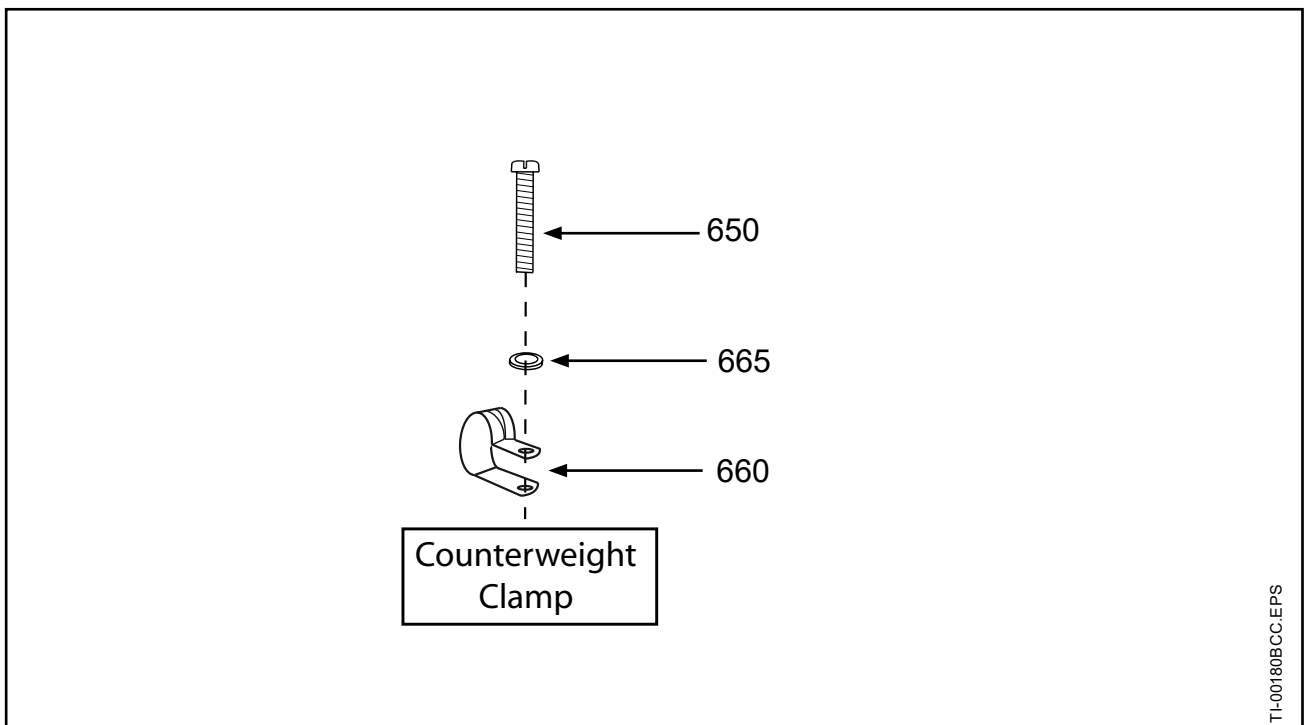
**Terminal Strip to Bulkhead Attachment  
Figure BJ-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-840-1 and 103616**



**Terminal Strip to Counterweight Clamp Attachment  
Figure BJ-4**

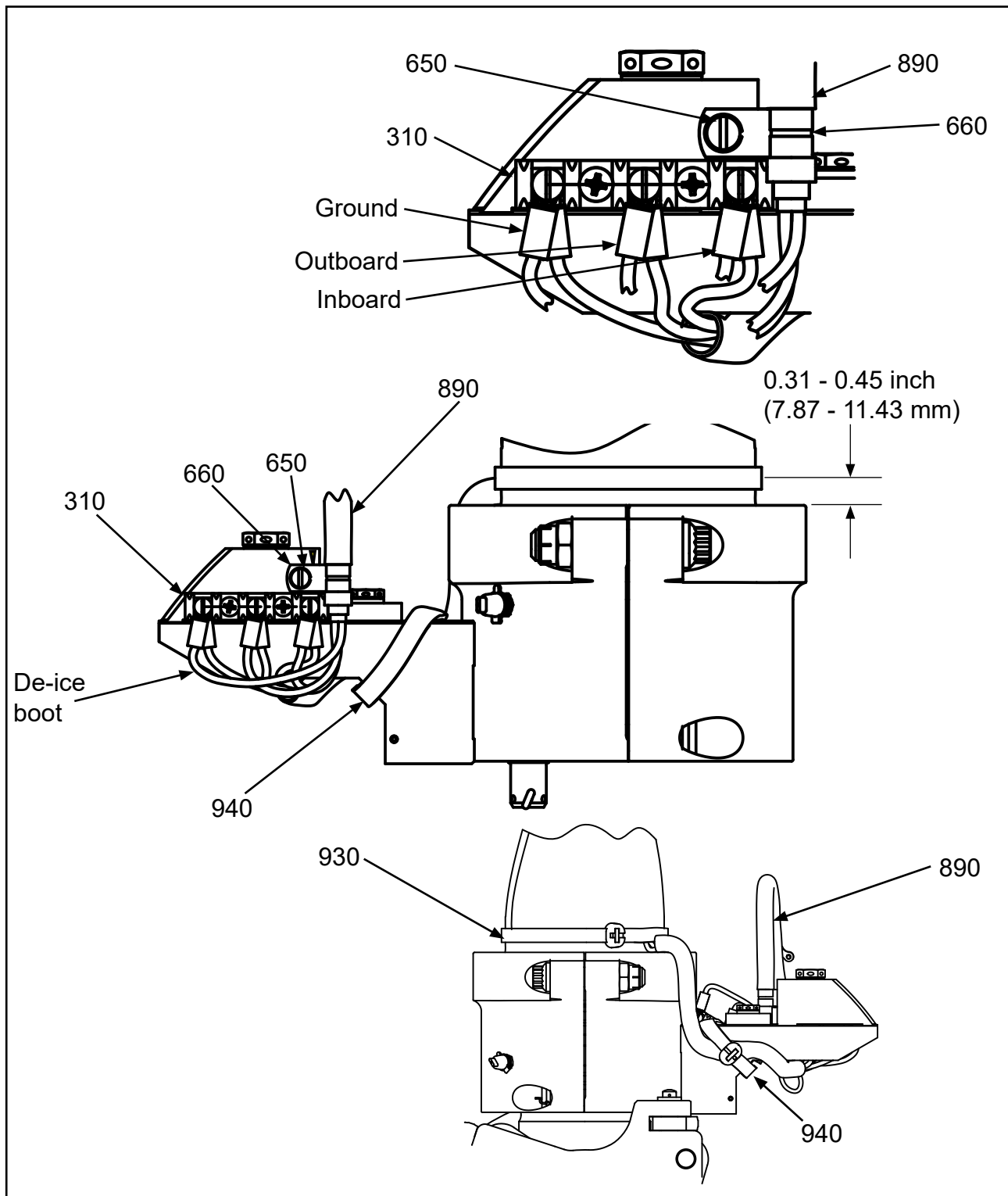


**Loop Clamp to Counterweight Clamp Attachment  
Figure BJ-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

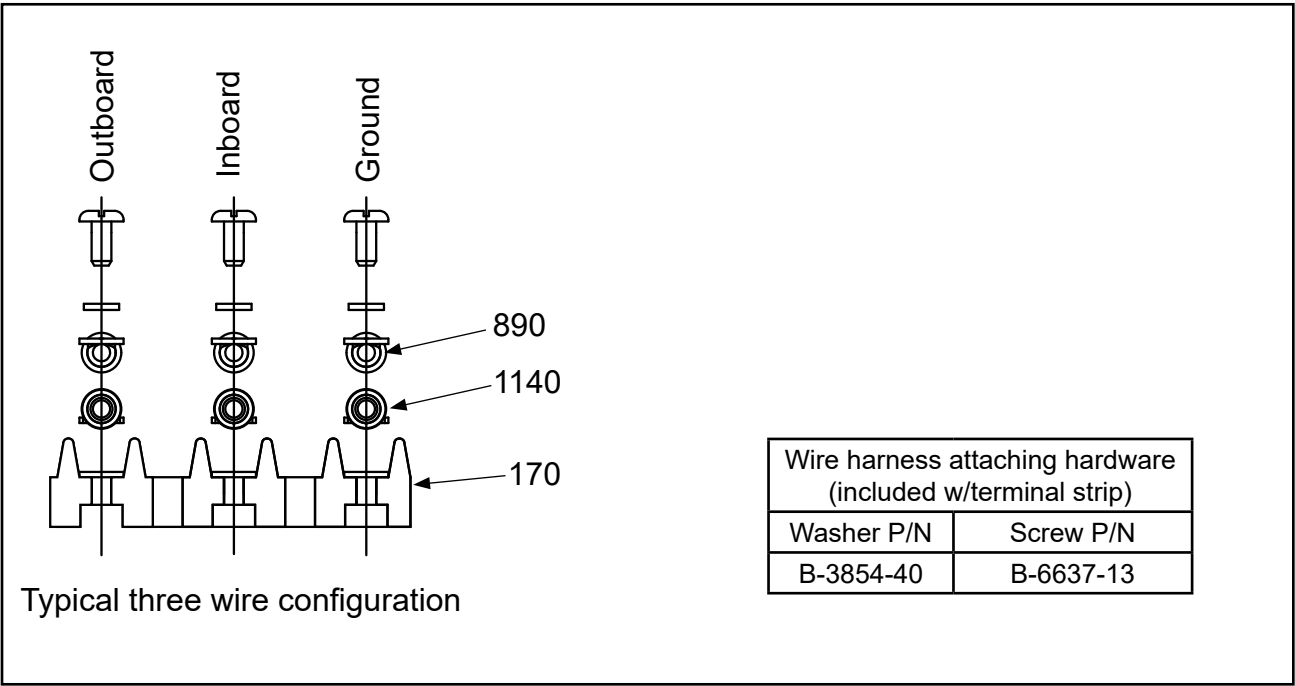
**7931-67-840-1 and 103616**



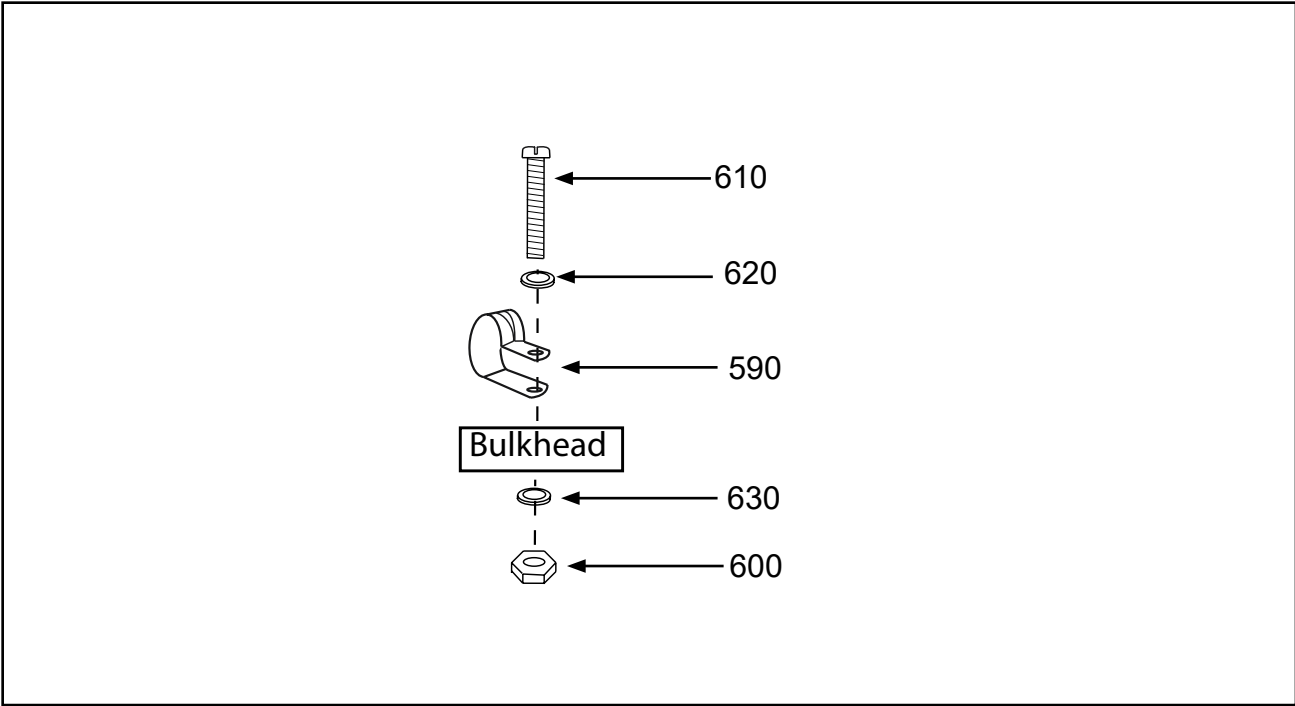
**Terminal Strip to Counterweight Clamp Attachment  
Figure BJ-6**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-840-1 and 103616**



**Lead Wire to Terminal Strip Attachment (Bulkhead)**  
**Figure BJ-7**



**Loop Clamp to Bulkhead Attachment**  
**Figure BJ-8**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-840-1 and 103616**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-840-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11BJ FIGURES: BJ-1 thru BJ-8</b>		
170	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY ITEM 170A	5	
170A	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES ITEM 170	5	
220	B-6631-233	• SCREW, 6-32, FILLISTER HEAD, CRES	10	Y
200	B-3854-41	• WASHER, LOCK	10	Y
590	B-6735	• CLAMP, LOOP, CUSHIONED	5	Y
600	B-6655-08	• NUT, HEX, SELF-LOCKING	5	Y
610	B-3856-247	• SCREW, 8-32, FILLISTER HEAD, CRES	5	Y
620	B-3854-42	• WASHER, LOCK	5	Y
630	B-3837-N832	• WASHER, CORROSION RESISTANT	5	Y
310	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY ITEM 310A	5	
310A	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES ITEM 310	5	
320	B-6637-30	• SCREW, PAN HEAD, CRES.	10	
330	B-3854-41	• WASHER, LOCK	10	Y
650	B-3856-245	• SCREW, 8-32, FILLISTER HEAD, CRES.	5	
660	B-6735	• CLAMP, LOOP, CUSHIONED	5	Y
665	B-3854-42	• WASHER, LOCK	5	Y
890	7931-4E1889-9	• DE-ICE WIRE HARNESS SUPERSEDED BY ITEM 890A	5	Y
890A	4H1889-9	• DE-ICE WIRE HARNESS SUPERSEDES ITEM 890	5	Y
930	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	5	Y
940	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	5	Y
1140	7931-4E3060-1	• SLIP RING ASSEMBLY SUPERSEDED BY ITEM 1140A	1	
1140A	4H3060-1	• SLIP RING ASSEMBLY SUPERSEDES ITEM 1140	1	
1160	B-3384-10H	• BOLT, 1/4-28, HEX HEAD	10	Y
1180	B-7077-52	• BELLEVILLE SPRING WASHER	10	Y
1190	B-3808-4	• NUT, HEX, SELF-LOCKING	10	Y
1200	B-3837-0432	• WASHER, CORROSION RESISTANT	10	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-67-840-1**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-840-1 and 103616**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>103616</b>	<b>PROPELLER DE-ICE KIT INSTALLATION INSTRUCTION 11BJ FIGURES: BJ-1 thru BJ-8</b>		
170	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM	5	
190	2H1365	• TAPPED EYELET	10	Y
200	B-3854-41	• WASHER, LOCK	10	Y
210	B-3854-41	• WASHER, LOCK	10	Y
220	B-6637-34	• SCREW, 6-32, FILLISTER HEAD, CRES	10	Y
500	B-6735	• CLAMP, LOOP, CUSHIONED	5	Y
600	B-6655-08	• NUT, HEX, SELF-LOCKING	5	Y
610	B-3856-247	• SCREW, 8-32, FILLISTER HEAD, CRES	5	Y
620	B-3854-42	• WASHER, LOCK	5	Y
630	B-3837-N832	• WASHER, CORROSION RESISTANT	5	Y
310	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM	5	
320	B-6637-30	• SCREW, PAN HEAD, CRES	10	Y
330	B-3854-41	• WASHER, LOCK	10	Y
650	B-3856-245	• SCREW, 8-32, FILLISTER HEAD, CRES	5	Y
660	B-6735	• CLAMP, LOOP, CUSHIONED	5	Y
665	B-3854-42	• WASHER, LOCK	5	Y
890	4H1889-9	• DE-ICE WIRE HARNESS	5	Y
930	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	5	Y
940	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	5	Y
1140	104472	• SLIP RING ASSEMBLY	1	
1160	B-3384-9H	• BOLT, 1/4-28, HEX HEAD	10	Y
1180	B-7077-52	• BELLEVILLE SPRING WASHER	10	Y
1190	B-3808-4	• NUT, HEX, SELF-LOCKING	10	Y
1200	B-3837-0432	• WASHER, CORROSION RESISTANT	10	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 103616**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-840-1 and 103616**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-855-1**

**BK.    Installation Instruction 11BK**

(1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

(a) 7E1786 Rev. A

1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)

b Hartzell Propeller Service Letter HC-SL-30-259

c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-855-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-855-1</b>	<b>PROPELLER DE-ICE KIT INSTALLATION INSTRUCTION 11BK</b>		
	102676	• TUBING, POLYURETHANE	3	Y
	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-3	5	
	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-3	5	
	B-6631-232	• SCREW, 6-32, FILLISTER HEAD, CRES	10	Y
	B-3854-41	• WASHER, LOCK	10	Y
	B-6735	• CLAMP, LOOP, CUSHIONED	5	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	5	Y
	B-3856-247	• SCREW, 8-32, FILLISTER HEAD, CRES	5	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	5	Y
	B-3854-42	• WASHER, LOCK	5	Y
	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-3	5	
	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-3	5	
	B-6631-231	• SCREW, 6-32, FILLISTER HEAD, CRES	10	Y
	B-3854-41	• WASHER, LOCK	10	Y
	B-3856-243	• SCREW, 8-32, FILLISTER HEAD, CRES	5	Y
	B-6735	• CLAMP, LOOP, CUSHIONED	5	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	5	Y
	3H2017-10	• WIRE HARNESS SUPERSEDES 7931-3E2017-10	5	Y
	7931-3E2017-10	• WIRE HARNESS SUPERSEDED BY 3H2017-10	5	Y
	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	5	Y
	7931-36151	• AMP 36151 PIDG RING TERMINAL SUPERSEDED BY 108318	10	Y
	108318	• TERMINAL, RING SUPERSEDES 7931-36151	10	Y
	4H2863	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E2863	1	
	7931-4E2863	• SLIP RING ASSEMBLY SUPERSEDED BY 4H2863	1	
	B-3384-10H	• BOLT, 1/4-28, HEX HEAD	10	Y
	B-3384-10	• BOLT, 1/4-28, HEX HEAD ALTERNATE FOR B-3384-10H	10	Y
	B-7077-52	• BELLEVILLE SPRING WASHER	10	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	10	Y
	B-3837-0432	• WASHER, CORROSION RESISTANT	10	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-67-855-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-920-1**

**BL.    Installation Instruction 11BL**

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 5E2602 Rev. B

- 1    Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

a    The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)

b    Hartzell Propeller Service Letter HC-SL-30-259

c    Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-920-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-920-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11BL</b>		
	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-3	3	
	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-3	3	
	B-3854-41	• WASHER, LOCK	6	Y
	B-6631-233	• SCREW, 6-32, FILLISTER HEAD, CRES	6	Y
	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	3	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	3	Y
	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	3	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	3	Y
	3H2092-2	• WIRE HARNESS SUPERSEDES 7931-3E2092-2	3	Y
	7931-3E2092-2	• WIRE HARNESS SUPERSEDED BY 3H2092-2	3	Y
	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	3	Y
	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	6	Y
	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	6	Y
	4H2551-1	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E2551-1	1	
	7931-4E2551-1	• SLIP RING ASSEMBLY SUPERSEDED BY 4H2551-1	1	
	A-2070-10	• SCREW, 1/4-28, BUTTON HEAD	12	Y
	B-7077-52	• BELLEVILLE SPRING WASHER	24	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	12	Y
	B-3837-0432	• WASHER, CORROSION RESISTANT	12	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-67-920-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-929-1**

**BM. Installation Instruction 11BM**

- (1) Refer to the Goodrich Corporation drawing listed below for installation instructions - except install the terminal strip hardware in accordance with Figure BM-1 in this section:

(a) 7E1804 Rev. B

1 Refer to the following Hartzell Propeller LLC documents for cross-reference information about Goodrich Corporation part numbers:

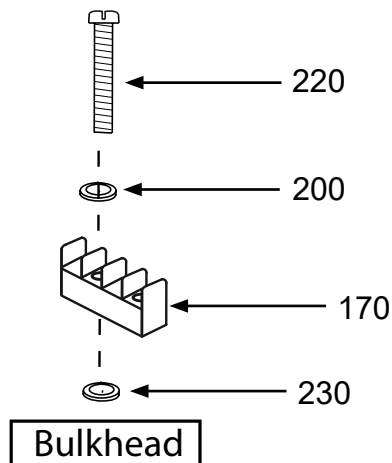
a The Vendor Cross-Reference chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02)

b Hartzell Propeller Service Letter HC-SL-30-259

c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-929-1**



**Terminal Strip to Bulkhead Attachment  
Figure BM-1**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-929-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-929-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11BM FIGURE: BM-1</b>		
170	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES ITEM 170A	4	
170A	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY ITEM 170	4	
200	B-3854-41	• WASHER, LOCK	8	Y
220	B-6631-233	• SCREW, 6-32, FILLISTER HEAD, CRES	8	Y
230	B-3854-41	• WASHER, LOCK	8	Y
	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	4	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
	B-6976-10	• SCREW, 8-32, WASHER HEAD	4	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	8	Y
	3H2092-2	• WIRE HARNESS SUPERSEDES 7931-3E2092-2	4	Y
	7931-3E2092-2	• WIRE HARNESS SUPERSEDED BY 3H2092-2	4	Y
	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	8	Y
	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	4	Y
	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	8	Y
	4H2448-1	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E2448-1	1	
	7931-4E2448-1	• SLIP RING ASSEMBLY SUPERSEDED BY 4H2448-1	1	
	B-3865-15A	• BOLT, 1/4-28, HEX HEAD, CRES SUPERSEDED BY 102831	4	Y
	102831	• BOLT, 1/4-28, HEX HEAD, CRES SUPERSEDES B-3865-15A	4	Y
	B-3384-26H	• BOLT, 1/4-28, HEX HEAD	8	Y
	B-7076-42	• BELLEVILLE SPRING WASHER	36	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	12	Y
	B-3837-0463	• WASHER, CORROSION RESISTANT	20	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-67-929-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-929-1**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-934-1**

**BN.    Installation Instruction 11BN**

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 5E2630 Rev. A

- 1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

- a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)
- b Hartzell Propeller Service Letter HC-SL-30-259
- c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-934-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-934-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11BN</b>		
	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-3	5	
	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-3	5	
	B-3854-41	• WASHER, LOCK	10	Y
	B-6631-233	• SCREW, 6-32, FILLISTER HEAD, CRES	10	Y
	B-6735	• CLAMP, LOOP, CUSHIONED	5	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	5	Y
	B-3856-247	• SCREW, 8-32, FILLISTER HEAD, CRES	5	Y
	B-3854-42	• WASHER, LOCK	5	Y
	B-3854-42	• WASHER, LOCK	5	Y
	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-3	5	
	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-3	5	
	B-6631-231	• SCREW, 6-32, FILLISTER HEAD, CRES	10	Y
	B-3854-41	• WASHER, LOCK	10	Y
	B-3856-243	• SCREW, 8-32, FILLISTER HEAD, CRES	5	Y
	B-6735	• CLAMP, LOOP, CUSHIONED	5	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	5	Y
	3H2017-10	• WIRE HARNESS SUPERSEDES 7931-3E2017-10	5	Y
	7931-3E2017-10	• WIRE HARNESS SUPERSEDED BY 3H2017-10	5	Y
	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	10	Y
	4H2863	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E2863	1	
	7931-4E2863	• SLIP RING ASSEMBLY SUPERSEDED BY 4H2863	1	
	B-3874-10A	• BOLT, 1/4-28, HEX HEAD	10	Y
	B-7077-52	• BELLEVILLE SPRING WASHER	10	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	10	Y
	B-3837-0432	• WASHER, CORROSION RESISTANT	10	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-67-934-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-939-1**

**BO. Installation Instruction 11BO**

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 5E2650 Rev. B

- 1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

- a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)
- b Hartzell Propeller Service Letter HC-SL-30-259
- c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-939-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-939-1</b>	<b>PROPELLER DE-ICE KIT INSTALLATION INSTRUCTION 11BO</b>		
	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-2	5	
	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-2	5	
	B-6655-06	• NUT, HEX, SELF-LOCKING	10	
	B-3854-41	• WASHER, LOCK	10	Y
	B-3837-N616	• WASHER, CORROSION RESISTANT	10	Y
	B-6631-233	• SCREW, 6-32, FILLISTER HEAD, CRES	10	Y
	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	5	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	5	Y
	B-3856-248	• SCREW, 8-32, FILLISTER HEAD, CRES	5	Y
	B-3854-42	• WASHER, LOCK	5	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	5	Y
	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-2	5	
	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-2	5	
	B-6631-231	• SCREW, 6-32, FILLISTER HEAD, CRES	10	Y
	B-3854-41	• WASHER, LOCK	10	Y
	B-3856-243	• SCREW, 8-32, FILLISTER HEAD, CRES	5	Y
	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	5	Y
	B-3854-42	• WASHER, CORROSION RESISTANT	5	Y
	7931-4E1889-10	• WIRE HARNESS SUPERSEDED BY 4N1889-10	5	Y
	4N1889-10	• WIRE HARNESS SUPERSEDES 7931-4E1889-10	5	Y
	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	5	Y
	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	5	Y
	7931-4E3062-1	• SLIP RING ASSEMBLY SUPERSEDED BY 4H3062-1	1	
	4H3062-1	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E3062-1	1	
	B-3384-16H	• BOLT, 1/4-28, HEX HEAD	5	Y
	B-3384-21H	• BOLT, 1/4-28, HEX HEAD	5	Y
	B-7077-52	• BELLEVILLE SPRING WASHER	10	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	10	Y
	B-3837-0463	• WASHER, CORROSION RESISTANT	10	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-67-939-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-941-1**

**BP.    Installation Instruction 11BP**

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 5E2663 Rev. L

1    Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

a    The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)

b    Hartzell Propeller Service Letter HC-SL-30-259

c    Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-941-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-941-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11BP</b>		
	B-7035-14	• SCREW, 6-32, PAN HEAD, BRASS	6	
	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	24	Y
	2H1260	• INSULATING BUSHING SUPERSEDES 7931-2E1260	12	
	7931-2E1260	• INSULATING BUSHING SUPERSEDED BY 2H1260	12	
	B-6641-265	• NUT, HEX, BRASS	18	Y
	B-6637-30	• SCREW, PAN HEAD, CRES.	6	
	3H1271-2	• CLIP, LEAD STRAP SUPERSEDES 7931-3E1271-2	3	
	7931-3E1271-2	• CLIP, LEAD STRAP SUPERSEDED BY 3H1271-2	3	
	B-3837-N632	• WASHER, CORROSION RESISTANT	6	Y
	B-6655-06	• NUT, HEX, SELF-LOCKING	6	Y
	2H1291	• DE-ICE RESTAINER STRAP SUPERSEDES 7931-2E1291	3	Y
	7931-2E1291	• DE-ICE RESTAINER STRAP SUPERSEDED BY 2H1291	3	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-67-941-1**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-77-025-1**

**BQ. Installation Instruction 11BQ**

(1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

(a) 7E1289 Rev. N

1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)

b Hartzell Propeller Service Letter HC-SL-30-259

c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-77-025-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-77-025-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11BQ</b>		
	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-2	3	
	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-2	3	
	B-3854-41	• WASHER, LOCK	6	Y
	B-6631-233	• SCREW, 6-32, FILLISTER HEAD, CRES	6	Y
	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	3	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	3	Y
	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	3	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	6	Y
	3H1848-1	• ASSEMBLY, TERMINAL CLAMP SUPERSEDES 7931-3E1848-1	3	
	B-3864-37	• • WASHER, LOCK, INTERNAL TOOTH	3	Y
	B-6641-265	• • NUT, HEX, BRASS		
	7931-3E1848-1	• ASSEMBLY, TERMINAL CLAMP SUPERSEDED BY 3H1848-1	3	
	B-6977-8	• SCREW, 8-32, FILLISTER HEAD SUPERSEDED BY B-3856-246	3	
	B-3856-246	• SCREW, 8-32, FILLISTER HEAD SUPERSEDES B-6977-80	3	Y
	B-6658-8	• SCREW, 10-32, FILLISTER HEAD	6	
	B-3837-0332	• WASHER, CORROSION RESISTANT	6	Y
	B-6735	• CLAMP, LOOP, CUSHIONED	3	Y
	B-3864-38	• WASHER, LOCK, INTERNAL TOOTH	3	
	3H1271-1	• CLIP, LEAD STRAP SUPERSEDES 7931-3E1271-1	3	
	7931-3E1271-1	• CLIP, LEAD STRAP SUPERSEDED BY 3H1271-1	3	
	4H1889-2	• DE-ICE WIRE HARNESS SUPERSEDES 7931-4E1889-2	3	Y
	7931-4E1889-2	• DE-ICE WIRE HARNESS SUPERSEDED BY 4H1889-2	3	Y
	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	3	Y
	4H1865-2	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E1865-2	1	
	7931-4E1865-2	• SLIP RING ASSEMBLY SUPERSEDED BY 4H1865-2	1	
	B-3865-16A	• BOLT, 1/4-28, HEX HEAD, CRES	9	Y
	B-7076-42	• BELLEVILLE SPRING WASHER	27	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	9	Y
	B-3837-0432	• WASHER, CORROSION RESISTANT	9	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-77-025-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-77-045-1**

**BR.**    Installation Instruction 11BR

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 7E1303 Rev. D

- 1    Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

- a    The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)
- b    Hartzell Propeller Service Letter HC-SL-30-259
- c    Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-77-045-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-77-045-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11BR</b>		
	B-7035-12	• SCREW, 6-32, PAN HEAD, BRASS	9	
	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	27	Y
	7931-2E1260	• INSULATING BUSHING SUPERSEDED BY 2H1260	18	
	2H1260	• INSULATING BUSHING SUPERSEDES 7931-2E1260	18	
	B-6641-265	• NUT, HEX, BRASS	18	Y
	B-6631-230	• SCREW, 6-32, FILLISTER HEAD, CRES	6	
	7931-3E1271-2	• CLIP, LEAD STRAP SUPERSEDED BY 3H1271-2	3	
	3H1271-2	• CLIP, LEAD STRAP SUPERSEDES 7931-3E1271-2	3	
	B-3837-N632	• WASHER, LOCK, INTERNAL TOOTH	6	Y
	B-6655-06	• NUT, HEX, BRASS	6	Y
	7931-4E1967-4	• WIRE HARNESS, KIT SUPERSEDED BY 4H1967-4	3	Y
	4H1967-4	• WIRE HARNESS, KIT SUPERSEDES 7931-4E1967-4	3	Y
	B-3852-1-0	• • STRAP, TIEDOWN, PLASTIC	3	Y
	B-3852-2-0	• • STRAP, TIEDOWN, PLASTIC	2	Y
	B-3852-4-0	• • STRAP, TIEDOWN, PLASTIC	1	
	101902	• • TERMINAL, RING	3	
	7931-320619	• • AMP 320619 PIDG RING TERMINAL ALTERNATE FOR 101902	3	
	7931-2-320619-1	• • AMP 320619 PIDG RING TERMINAL ALTERNATE FOR 101902	3	
	108567	• • SPLICE, BUTT	3	
	7931-320562	• • SPLICE, BUTT ALTERNATE FOR 108567	3	
	SAE-AMS-I-7444	• • CLEAR VINYL TUBING		

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-77-045-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-77-195-1**

**BS.**    Installation Instruction 11BS

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 7E1222 Rev. U

- 1    Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

- a    The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)
- b    Hartzell Propeller Service Letter HC-SL-30-259
- c    Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-77-195-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-77-195-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11BS</b>		
	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-2	3	
	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-2	3	
	B-6631-233	• SCREW, 6-32, FILLISTER HEAD, CRES	6	Y
	B-3854-41	• WASHER, LOCK	6	Y
	B-3837-N632	• WASHER, CORROSION RESISTANT	6	Y
	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	3	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	3	Y
	B-3856-247	• SCREW, 8-32, FILLISTER HEAD, CRES	3	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	6	Y
	3H1883-2	• ASSEMBLY, TERMINAL CLAMP SUPERSEDES 7931-3E1883-2	3	
	B-3864-37	• • WASHER, LOCK, INTERNAL TOOTH	3	Y
	B-6641-265	• • NUT, HEX, BRASS	3	
	7931-3E1883-2	• ASSEMBLY, TERMINAL CLAMP SUPERSEDED BY 3H1883-2	3	
	B-3864-38	• WASHER, LOCK, INTERNAL TOOTH	3	
	B-6977-8	• SCREW, 8-32, FILLISTER HEAD	3	
	B-6658-8	• SCREW, 10-32, FILLISTER HEAD	6	
	B-3837-0332	• WASHER, CORROSION RESISTANT	6	Y
	B-6735	• CLAMP, LOOP, CUSHIONED	3	Y
	4H1889-2	• DE-ICE WIRE HARNESS SUPERSEDES 7931-4E1889-2	3	Y
	7931-4E1889-2	• DE-ICE WIRE HARNESS SUPERSEDED BY 4H1889-2	3	Y
	7931-4E1526-1	• SLIP RING ASSEMBLY (REQUIRES B-3068 BULKHEAD SPACER)* SUPERSEDED BY 4H1526-1	1	
	4H1526-1	• SLIP RING ASSEMBLY (REQUIRES B-3068 BULKHEAD SPACER)* SUPERSEDES 7931-4E1526-1 SUPERSEDED BY 4H1526-4	1	
	4H1526-4	• SLIP RING ASSEMBLY* SUPERSEDES 4H1526-1	1	
	B-3384-23	• BOLT, 1/4-28, HEX HEAD	9	Y
	B-7076-42	• BELLEVILLE SPRING WASHER	27	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	9	Y
	B-3837-0463	• WASHER, CORROSION RESISTANT	9	Y
		* The B-3068 bulkhead spacer is part of the propeller assembly. The spacer is <u>not</u> used with the 4H1526-4 slip ring assembly.		

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-77-195-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-77-870-1**

**BT.**    Installation Instruction BT

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 7E1207

- 1    Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

- a    The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)
- b    Hartzell Propeller Service Letter HC-SL-30-259
- c    Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-77-870-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-77-870-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11BT</b>		
	B-6655-06	• NUT, HEX, SELF-LOCKING	4	Y
	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	18	Y
	B-7035-12	• SCREW, 6-32, PAN HEAD, BRASS	6	
	2H1260	• INSULATING BUSHING	12	
	B-6641-265	• NUT, HEX, BRASS	12	Y
	B-6637-30	• SCREW, PAN HEAD, CRES	4	
	3H1271-2	• CLIP, LEAD STRAP	2	
	B-3837-N632	• WASHER, CORROSION RESISTANT	4	Y
	104024-88S	• HOSE CLAMP	2	
	7931-2E1258	• DE-ICE RUBBER CUSHION	4	
	3H1452	• SLIP RING WIRE HARNESS	2	

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-77-870-1**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-77-900-1A**

**BU. Installation Instruction 11BU**

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 7E1255 Rev. T

- 1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

- a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)
- b Hartzell Propeller Service Letter HC-SL-30-259
- c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-77-900-1A**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-77-900-1A</b>	<b>PROPELLER DE-ICE KIT INSTALLATION INSTRUCTION 11BU</b>		
	3H1883-2	• ASSEMBLY, TERMINAL CLAMP SUPERSEDES 7931-3E1883-2	4	
	B-3864-37	• • WASHER, LOCK, INTERNAL TOOTH	3	Y
	B-6641-265	• • NUT, HEX, BRASS	3	
	7931-3E1883-2	• ASSEMBLY, TERMINAL CLAMP SUPERSEDED BY 3H1883-2	4	
	B-3837-0332	• WASHER, CORROSION RESISTANT	8	Y
	B-6658-8	• SCREW, 10-32, FILLISTER HEAD	8	

- ITEM NOT ILLUSTRATED

**De-ice Kit: 7931-77-900-1A**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-77-970-1**

**BV. Installation Instruction 11BV**

(1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

(a) 7E1315 Rev. P

1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)

b Hartzell Propeller Service Letter HC-SL-30-259

c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-77-970-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-77-970-1</b>	<b>PROPELLER DE-ICE KIT INSTALLATION INSTRUCTION 11BV</b>		
	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-2	5	
	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-2	5	
	B-3854-41	• WASHER, LOCK	10	Y
	B-6631-231	• SCREW, 6-32, FILLISTER HEAD, CRES	10	Y
	B-6735	• CLAMP, LOOP, CUSHIONED	5	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	5	Y
	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	5	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	10	Y
	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES 7931-1E1150-2	5	
	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY 1H1150-2	5	
	B-6631-233	• SCREW, 6-32, FILLISTER HEAD, CRES	10	Y
	B-3854-41	• WASHER, LOCK	10	Y
	B-3856-243	• SCREW, 8-32, FILLISTER HEAD, CRES	5	Y
	B-6735	• CLAMP, LOOP, CUSHIONED	5	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	5	Y
	7931-3E1849-8	• TRANSFLEX TUBING, P/N 3E1849-8	5	
	4H1889-4	• DE-ICE WIRE HARNESS SUPERSEDES 7931-4E1889-4	5	Y
	7931-4E1889-4	• DE-ICE WIRE HARNESS SUPERSEDED BY 4H1889-4	5	Y
	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	5	Y
	7931-36151	• AMP 36151 PIDG RING TERMINAL SUPERSEDED BY 108318	15	Y
	108318	• TERMINAL, RING SUPERSEDES 7931-36151	15	Y
	4H1988-1	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E1988-1	1	
	7931-4E1988-1	• SLIP RING ASSEMBLY SUPERSEDED BY 4H1988-1	1	
	B-3874-7A	• BOLT, 1/4-28, HEX HEAD SUPERSEDED BY B-3384-8H	10	
	B-3384-8H	• BOLT, 1/4-28, HEX HEAD SUPERSEDES B-3874-7A	10	Y
	B-7077-52	• BELLEVILLE SPRING WASHER	10	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	10	Y
	B-3837-0432	• WASHER, CORROSION RESISTANT	10	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 7931-77-970-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

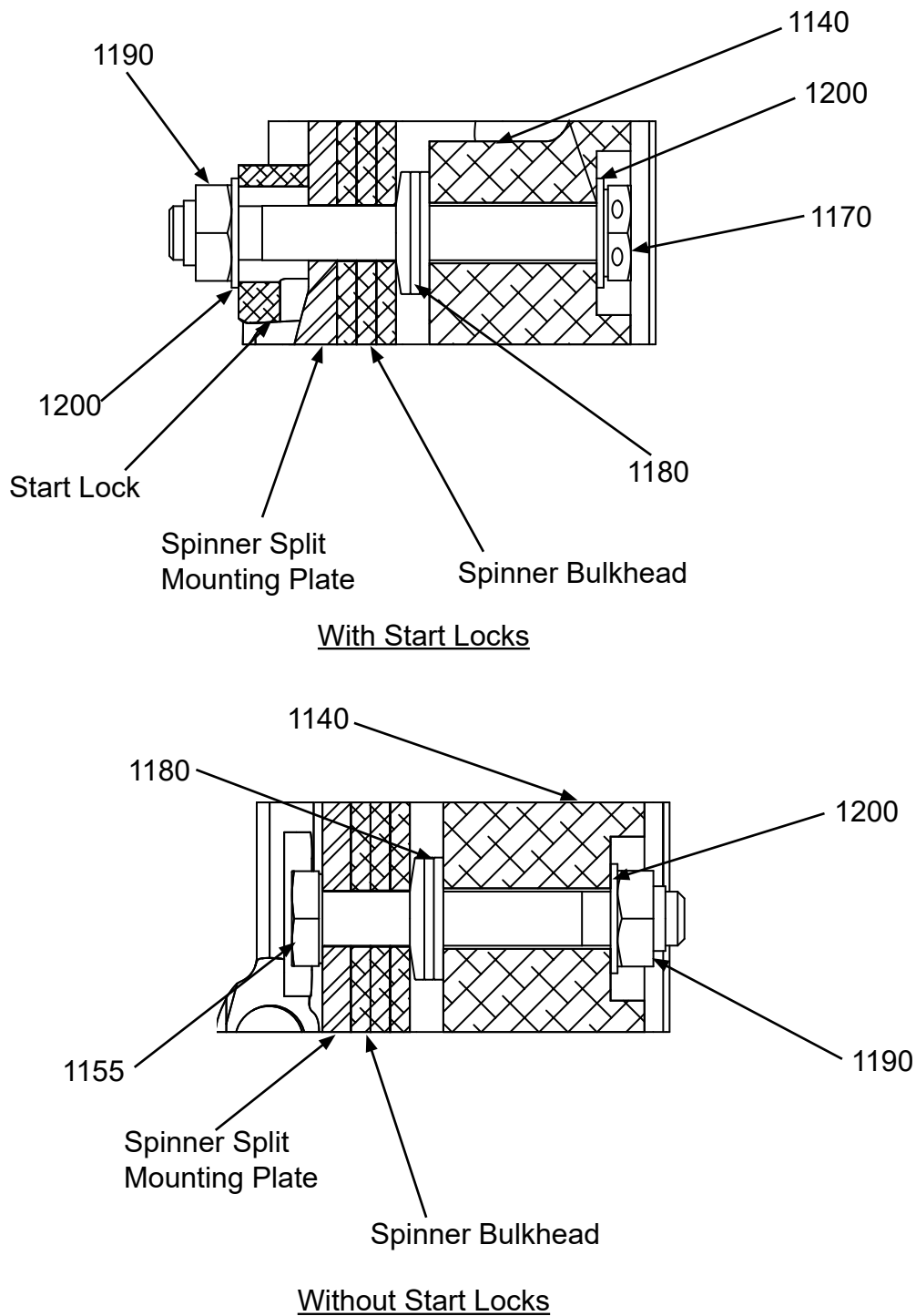
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**100020**

**BW. Installation Instruction 11BW**

- (1) Using the bolts (1170 and 1155), Belleville spring washers (1180), washers (1200), and nuts (1190), attach the slip ring (1140) to the spinner split mounting plate as shown in Figure BW-1.
  - (a) Torque the nuts (1190) to 40-120 in. lb. (4.5-13.5 N•m).
- (2) Perform slip ring run-out check in accordance with the Check chapter of this manual.
- (3) Position the propeller blades at high blade angle.
- (4) Using screws (220) and washers (200) attach the terminal strip (170) to the bulkhead as shown in the applicable configuration and Figure BW-2.
  - (a) Torque the screws (220) to 10-12 in. lb. (1.12-1.35 N•m).
- (5) Install the slip ring lead wires and the lead wires of the de-ice wire harness (890) of equal length to the terminal strip (170) in accordance with Figure BW-3 and Figure BW-4.
- (6) Orient the terminal ends of the slip ring lead wires and the de-ice wire harness lead wires as shown in Figure BW-4.
- (7) Attach the clamp (590) around the de-ice wire harness (890).
- (8) Using screws (610), washers (630), and nuts (600), attach the clamp (590) to the bulkhead as shown in Figure BW-5 and Figure BW-4.
- (9) Orient the centerline of the clamp (590) parallel to the terminal strip (170) as shown in Figure BW-4.
- (10) Attach the terminal ends of the de-ice wire harness (890) and the terminal ends of the de-ice boots as shown in Figure BW-6.
- (11) Orient the terminal ends of the de-ice boot and the de-ice wire harness lead wires as shown in Figure BW-6.
- (12) Using screws (750) and washers (760), attach the terminal clamp assembly (700) to the clamp as shown in Figure BW-6.
- (13) Tighten the screws (750) until snug.
- (14) Attach the clamp (770) around the de-ice wire harness (890).
- (15) Using screws (730) and washers (720), attach the clamp (770) to the terminal clamp assembly (700) as shown in Figure BW-6.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

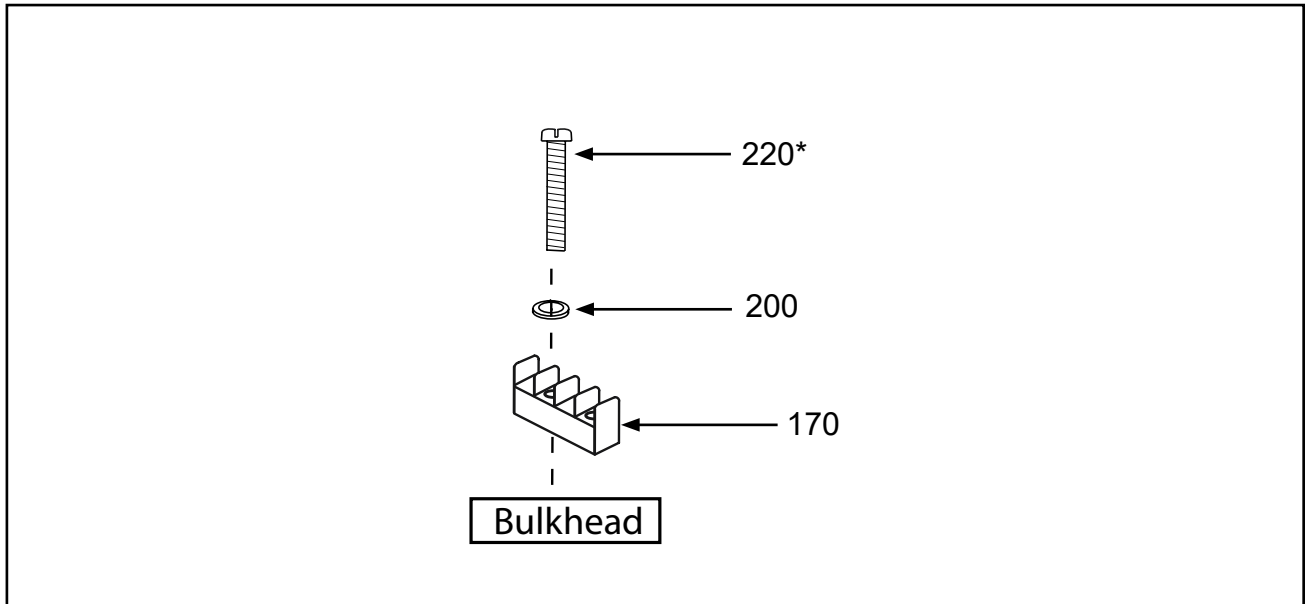
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**100020**



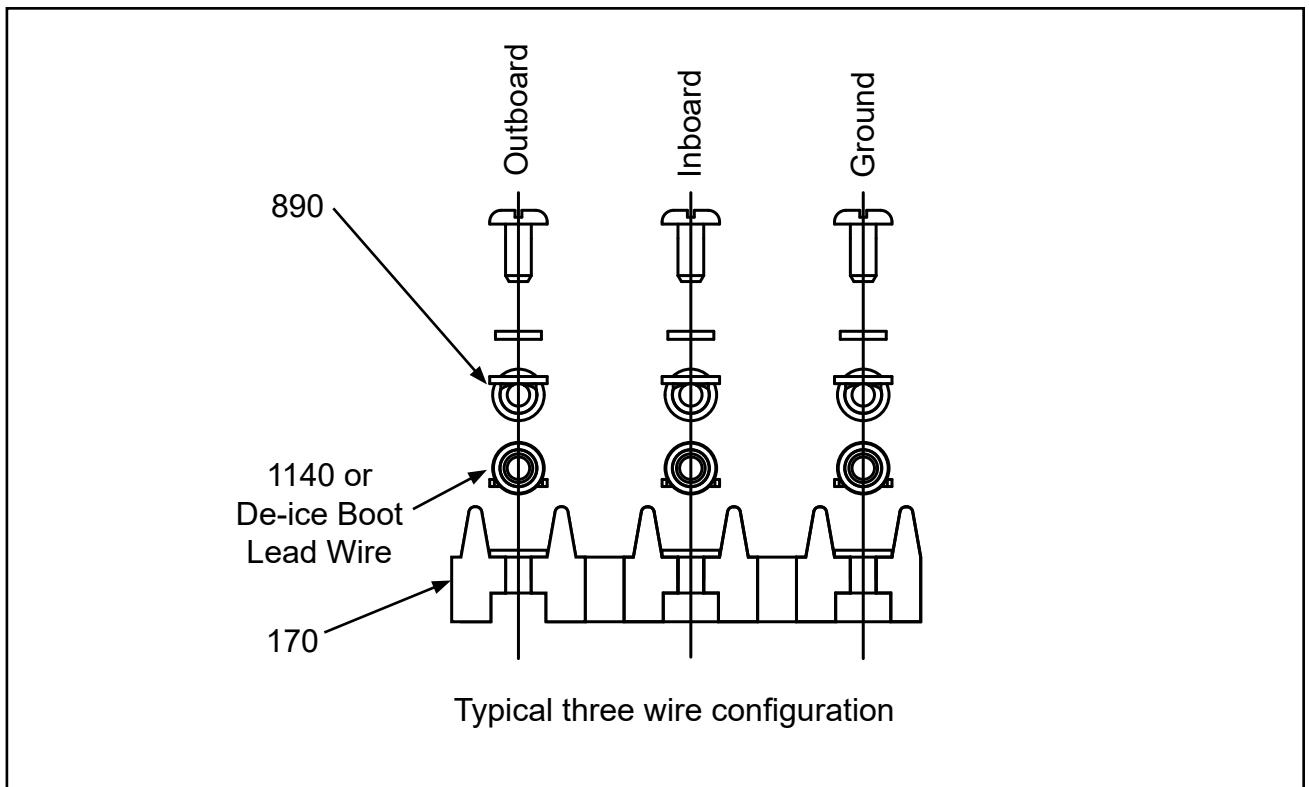
**Slip Ring Mounting  
Figure BW-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**100020**



**Terminal Strip to Bulkhead Attachment  
Figure BW-2**

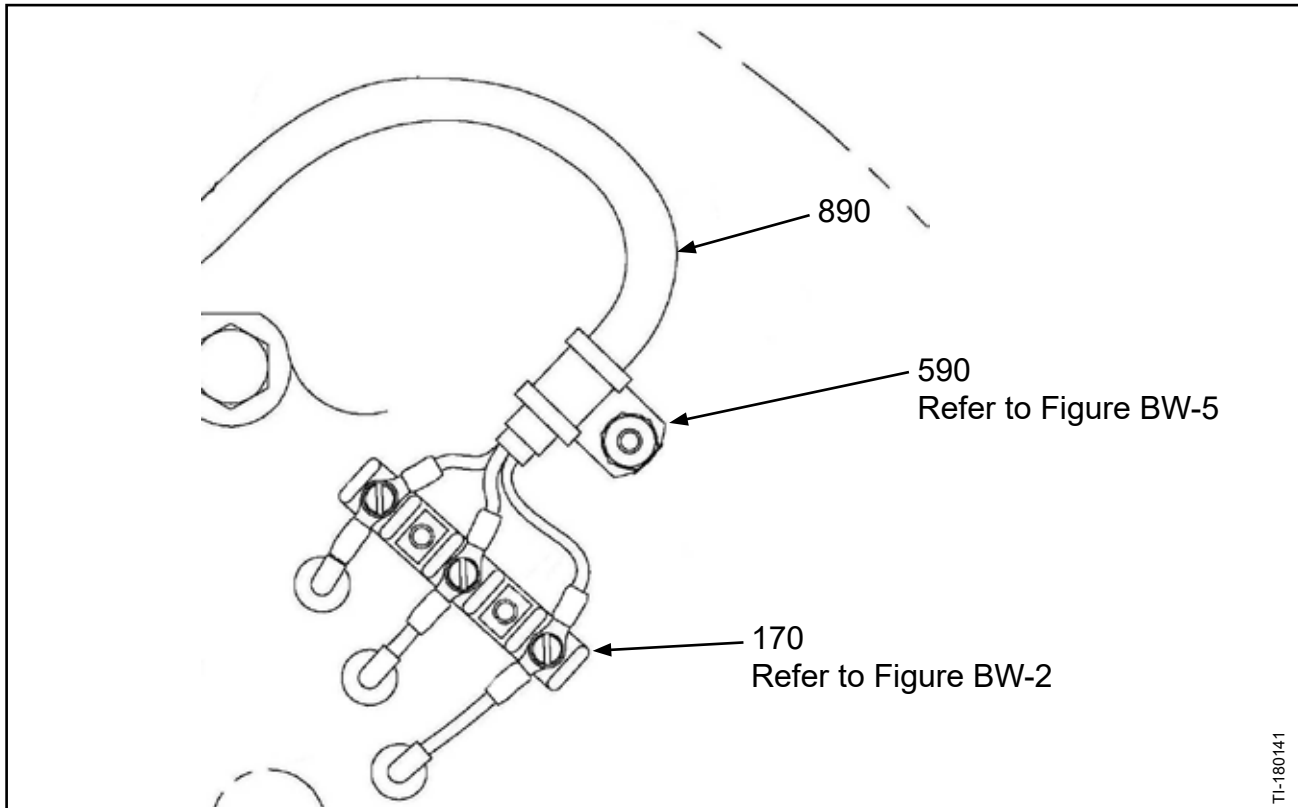


**Lead Wire to Terminal Strip Attachment  
Figure BW-3**

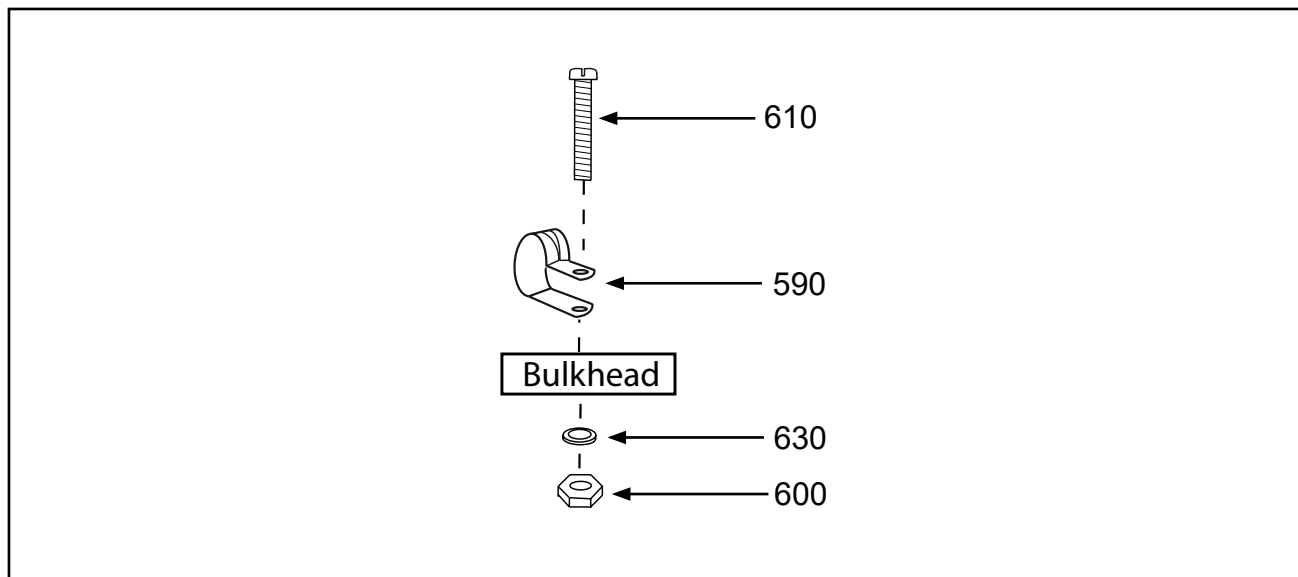
**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**100020**



**Orientation of the Loop Clamp to Terminal Strip on the Bulkhead  
Figure BW-4**



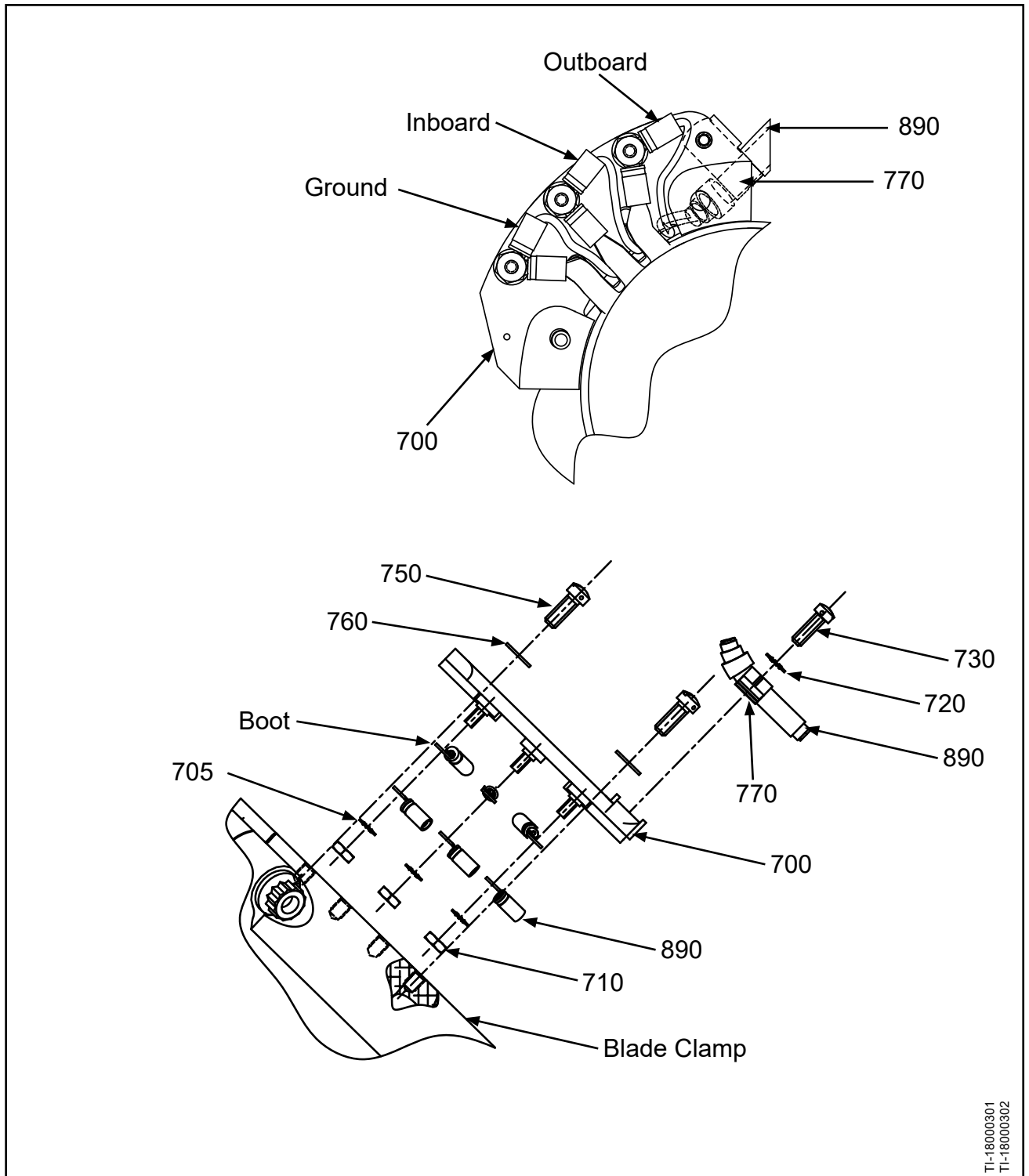
**Loop Clamp to Bulkhead Attachment  
Figure BW-5**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**100020**



**Installation of Terminal Clamp Assembly on Blade Clamp  
Figure BW-6**

TI-18000301  
TI-18000302

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**100020**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>100020</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11BW</b> <b>FIGURES: BW-1 thru BW-6</b>		
170	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM	4	
200	B-3854-41	• WASHER, LOCK	8	Y
220	B-6631-233	• SCREW, 6-32, FILLISTER HEAD, CRES	8	Y
590	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	4	Y
600	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
610	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
630	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
700	3H1848-1	• ASSEMBLY, TERMINAL CLAMP	4	
705	B-3864-37	• • WASHER, LOCK, INTENAL TOOTH	3	Y
710	B-6641-265	• • NUT, HEX, BRASS	3	
720	B-3864-38	• WASHER, LOCK, INTERNAL TOOTH	4	Y
730	B-6977-8	• SCREW, 8-32, FILLISTER HEAD	4	
750	B-6658-8	• SCREW, 10-32, FILLISTER HEAD	8	
760	B-3837-0332	• WASHER, CORROSION RESISTANT	8	Y
770	B-6735	• CLAMP, LOOP, CUSHIONED	4	Y
890	4H1889-2	• DE-ICE WIRE HARNESS	4	Y
1140	4H1964-2	• SLIP RING ASSEMBLY	1	
1155	102831	• BOLT, 1/4-28, HEX HEAD, CRES	4	Y
1170	B-3384-25H	• BOLT, 1/4-28, HEX HEAD	8	Y
1180	B-7076-42	• BELLEVILLE SPRING WASHER	36	Y
1190	B-3808-4	• NUT, HEX, SELF-LOCKING	12	Y
1200	B-3837-0432	• WASHER, CORROSION RESISTANT	20	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit: 100020**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**101820-1**

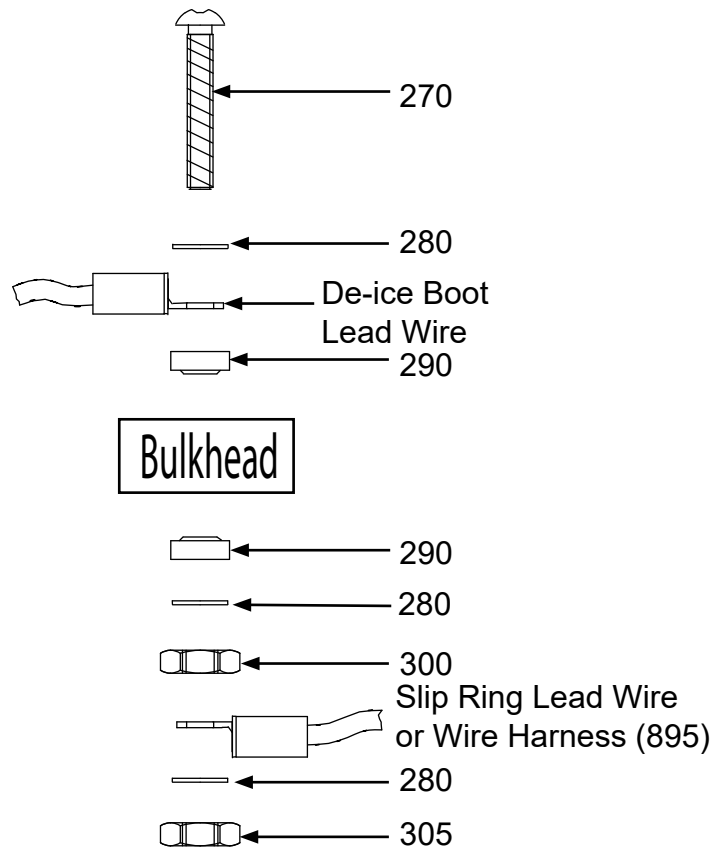
**BX. Installation Instruction BX**

- (1) Connect the staggered leads of the slip ring wire harness (895) to the slip ring in accordance with the Aircraft Maintenance Manual.
- (2) Connect the de-ice boot lead wires and the slip ring wire harness leads that are the same length to the bulkhead in accordance with Figure H-1 and Figure BX-2.
- (3) Torque the nut (300) to 6-8 in. lbs. (0.6-0.9 N•m).
- (4) Torque the nut (305) to 10-12 in. lbs. (1.1-1.3 N•m).
- (5) Use the lead clip to secure the de-ice boot lead strap to the bulkhead in accordance with Figure BX-2, Figure BX-3, and Figure BX-4.
- (6) Tighten the nut (380) until snug.
- (7) Attach the slip ring wire harness (895) to the hub with the tie straps (1820), as shown in Figure BX-5.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**101820-1**



**De-ice Boot Lead Wire/Slip Ring Lead Wire Hardware  
Figure BX-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**101820-1**

Lead wires must lay flat. Do not permit lead  
wires to make contact with the side edge of  
the bulkhead.

360

De-ice Boot Lead Strap

895

Spinner Bulkhead

Refer to Figure BX-1

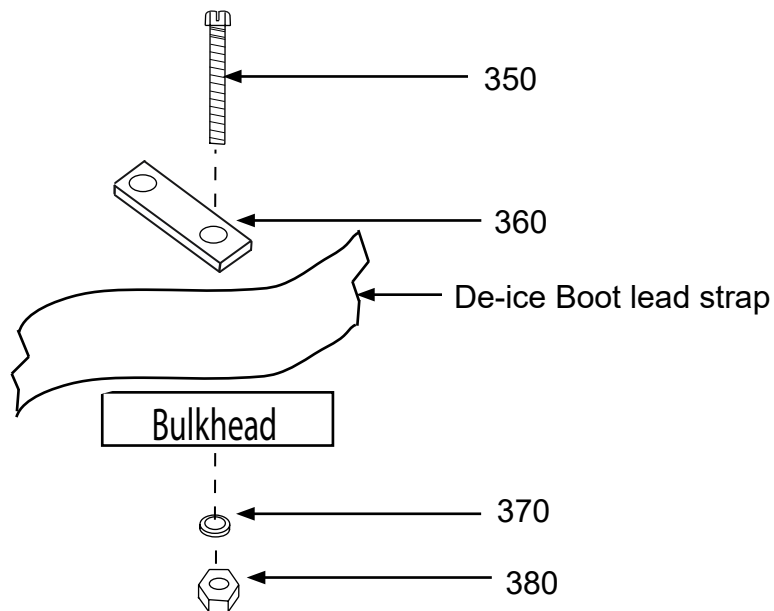
Refer to Figure BX-3

**Lead Clip and De-ice Boot Lead Strap and Lead Wire Attachment to Bulkhead  
Figure BX-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**101820-1**

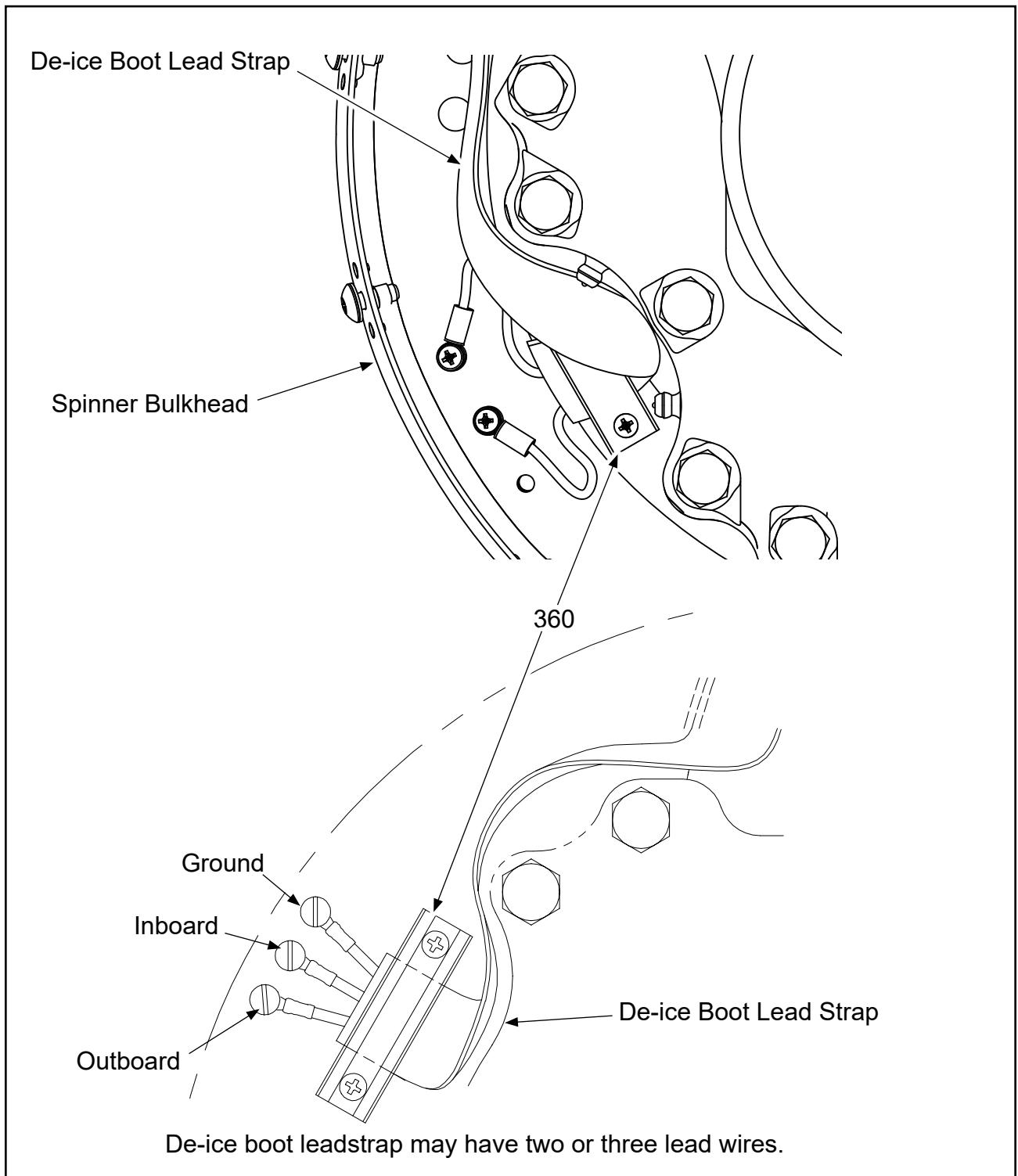


**Lead Clip Attachment to Bulkhead  
Figure BX-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**101820-1**

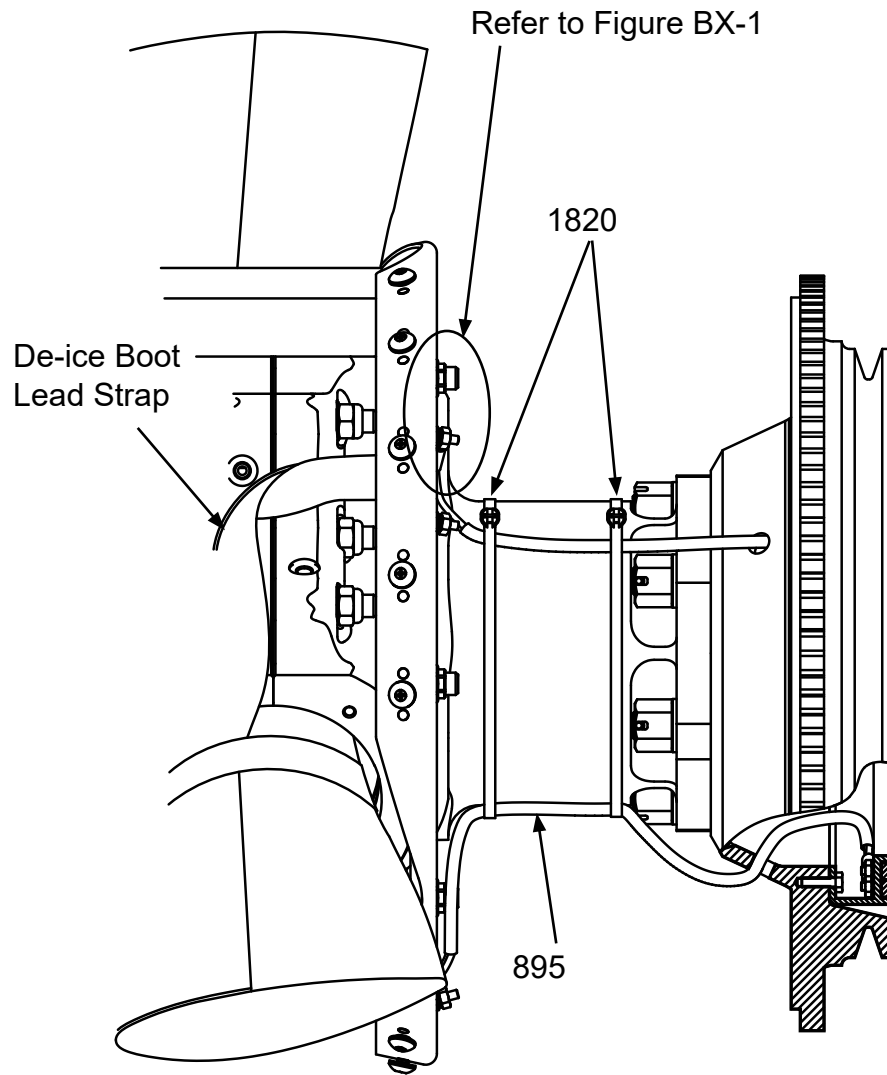


**Lead Clip and De-ice Boot Lead Strap and Lead Wires Attachment to Bulkhead  
Figure BX-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**101820-1**



**Securing Slip Ring Wire Harness to Hub  
Figure BX-5**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**101820-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>101820-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11BX</b> <b>FIGURES: BX-1 THRU BX-5</b>		
1820	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	2	Y
840	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	6	Y
1300	B-6265	• BRACKET, WIRE HARNESS	3	
1830	B-3599	• NUT, 3/8-24, HEX, SELF-LOCKING	3	
1840	B-3834-0632	• WASHER	3	
1850	B-3834-0663	• WASHER	6	Y
270	B-7035-12	• SCREW, 6-32, PAN HEAD, BRASS	9	
280	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	27	
290	2H1260	• BUSHING, INSULATING	18	
300	B-6641-265	• NUT, HEX, BRASS	9	
305	B-6641-265	• NUT, HEX, BRASS	9	

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 101820-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**101820-1**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

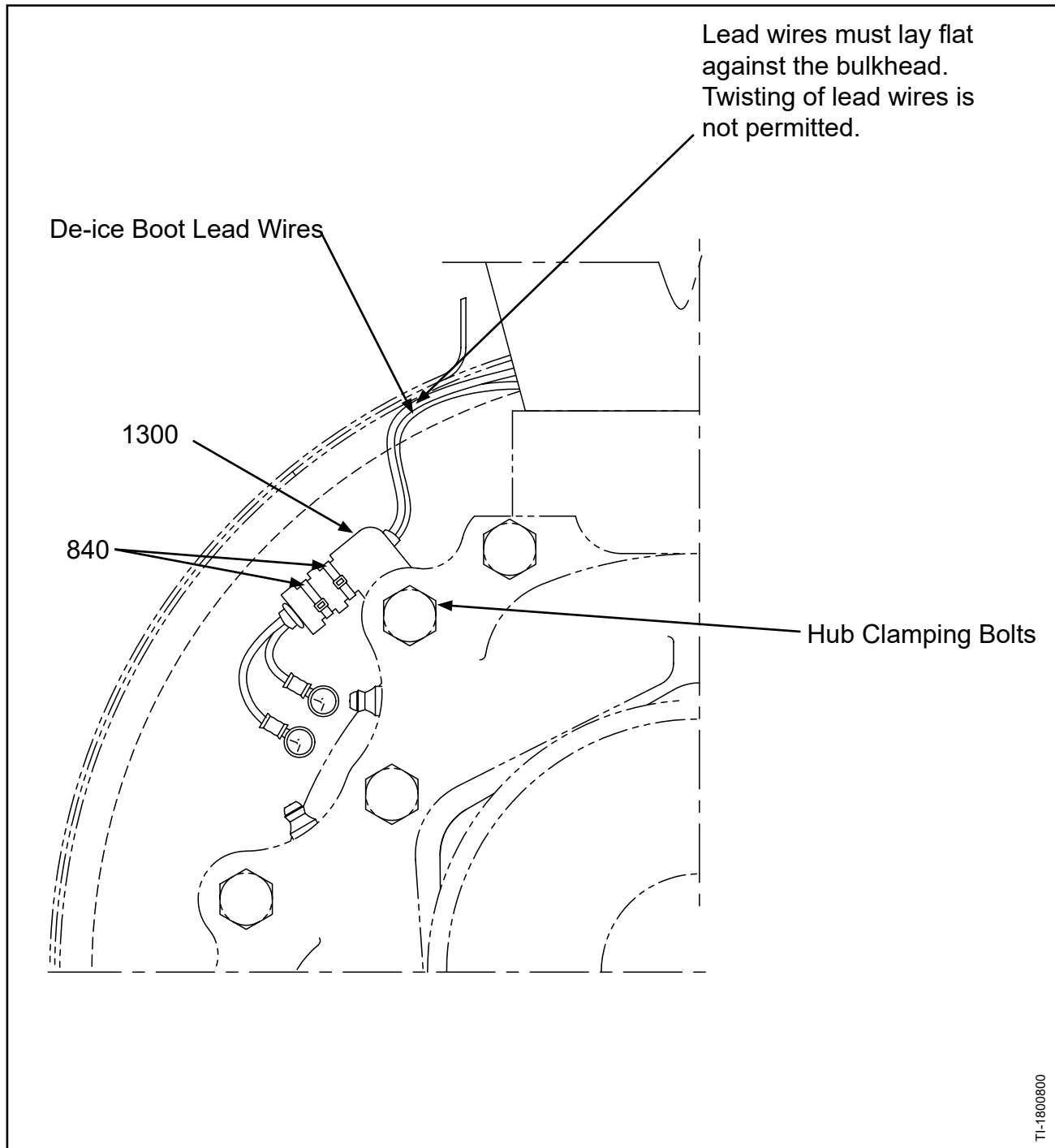
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**102014-1 and 102014-6**

**BY. Installation Instruction 11BY**

- (1) Make sure the de-ice boot lead wires lay flat against the bulkhead.
  - (a) Twisting of the lead wires is not permitted.
- (2) Put the de-ice boot lead wire on the bracket (1300) with the O-ring positioned as shown in Figure BY-1.
  - (a) Align the bracket (1300) with the hub as shown in Figure 10B-1.
- (3) Install the tie straps (840) as shown in Figures BY-1.
- (4) Connect the de-ice boot lead wires and the slip ring wire harness (895) to the bulkhead. Refer to Figure BY-2.
  - (a) Torque the nut (300) to 6-8 in.lbs. (0.68 - 0.90 N•m).
- (5) Using the hardware supplied with the slip ring drive pulley, install the terminal ends of the slip ring wire harness to the terminal studs of the slip ring drive pulley.
- (6) Using the tie straps (1820), secure the slip ring wire harness (895) to the hub as shown in Figure BY-3.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

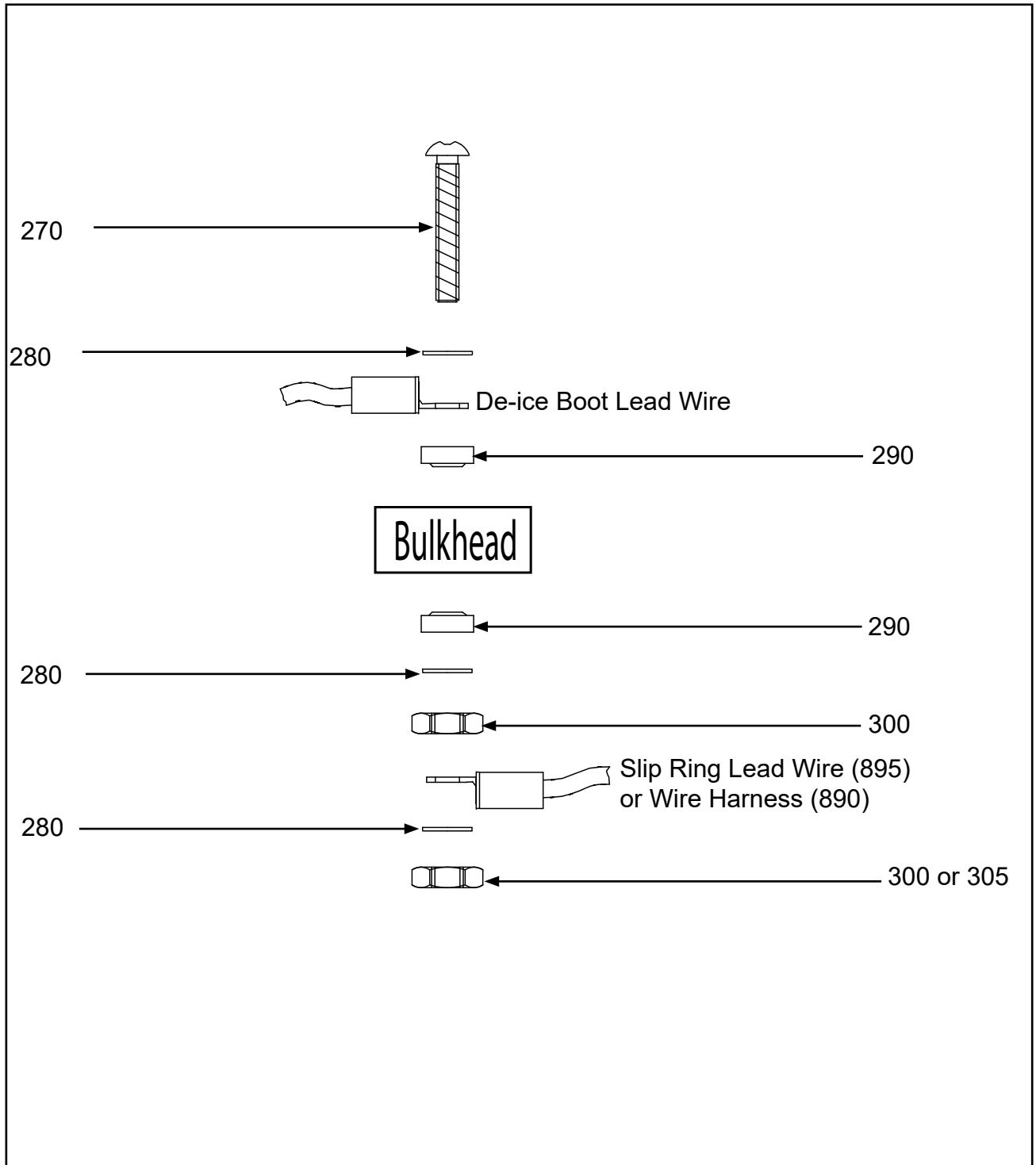
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**102014-1 and 102014-6**



**Securing De-ice Boot Lead Wire to Bracket on Hub**  
**Figure BY-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

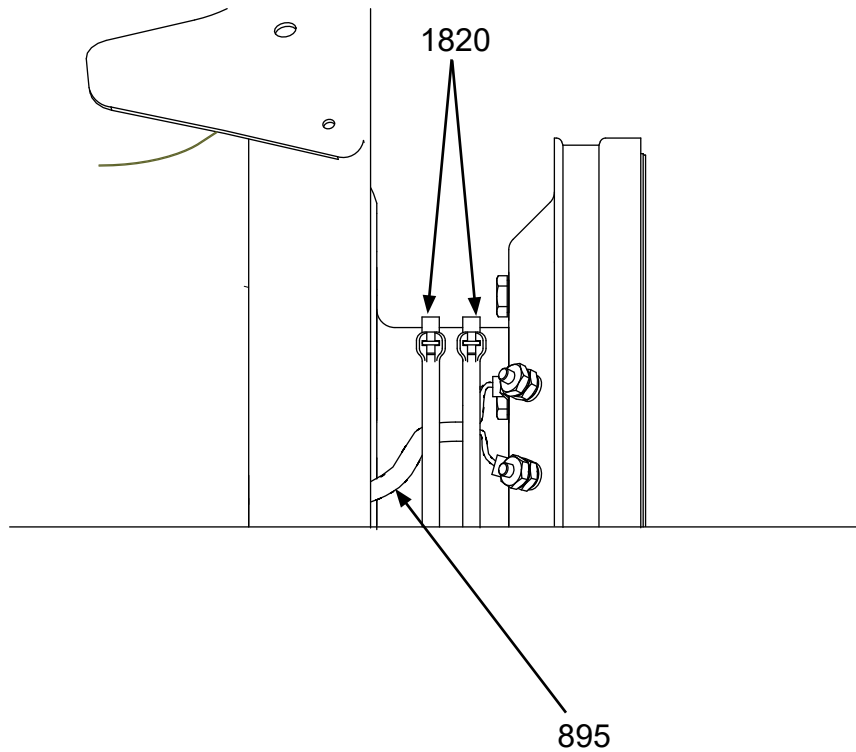
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**102014-1 and 102014-6**



**De-ice Boot Lead Wire and Slip Ring Lead Wire or Wire Harness to Bulkhead  
Figure BY-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**102014-1 and 102014-6**



**Securing De-ice Boot Lead Wire Hub  
Figure BY-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**102014-1 and 102014-6**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>102014-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11BY</b> <b>FIGURES: BY-1 thru BY-3</b>		
840	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	6	Y
270	B-7035-12	• SCREW, 6-32, PAN HEAD, BRASS	6	
280	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	18	
290	2H1260	• INSULATING BUSHING	12	
300	B-6641-265	• NUT, HEX, BRASS	12	
895	102293	• SLIP RING WIRE HARNESS	3	
1820	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	2	Y
	<b>102014-6</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11BY</b> <b>FIGURES: BY-1 thru BY-3</b>		
840	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	6	Y
270	B-7035-12	• SCREW, 6-32, PAN HEAD, BRASS	6	
280	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	18	
290	2H1260	• INSULATING BUSHING	12	
300	B-6641-265	• NUT, HEX, BRASS	12	
1820	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	2	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 102014-1 and 102014-6**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**102014-1 and 102014-6**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**102195-1**

**BZ.    Installation Instruction 11BZ**

- (1) Using the bolts (1160), Belleville spring washers (1180), washers (1200), and nuts (1190), attach the slip ring (1140) to the spinner split mounting plate as shown in Figure BZ-1.
  - (a) Torque the bolts (1160) to 40-120 in. lbs. (4.51-13.55 N•m).
- (2) Perform slip ring run-out check in accordance with the Check chapter of this manual.
- (3) Position the propeller blades at reverse blade angle.
- (4) Assemble the plug connection between the wire harness (890) and the de-ice boot.
- (5) Install the tie strap (920) around the wire harness/de-ice boot plug connection. Do not tighten at this time.
- (6) Secure the wire harness/de-ice boot connection to the clamp.
  - (a) Install tie straps (930) under the tie strap (920) connecting the wire harness/de-ice boot plugs, and around the clamp as shown in Figure BZ-2.
  - (b) Positioning the tie strap head in the approximate location shown on the side of the clamp as shown in Figure BZ-2. Do not tighten the tie strap (930) at this time.
- (7) Route the wire harness (890) over the inboard tie strap (930) and under the outboard tie strap (930) as shown in Figure BZ-2.
- (8) Position the center of the wire harness/de-ice boot plug connection in line with the aft side of the counterweight within 0.125 inch (3.175 mm) as shown in Figure BZ-2.
- (9) Using a tie strap (920), secure the de-ice boot lead wire to the outboard tie strap (930) as shown in Figure BZ-2. The tie strap (920) must cover the de-ice boot lead wire tubing. Do not tighten at this time.
- (10) Using tie strap (920) secure the wire harness (890) to the outboard tie strap (930) as shown in Figure BZ-2. The tie strap (920) must be located within 0.125 inch (3.175 mm) of the blade clamp parting line. Do not tighten at this time.
- (11) Position the wire harness/de-ice boot plug connection as shown in Figure BZ-2.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

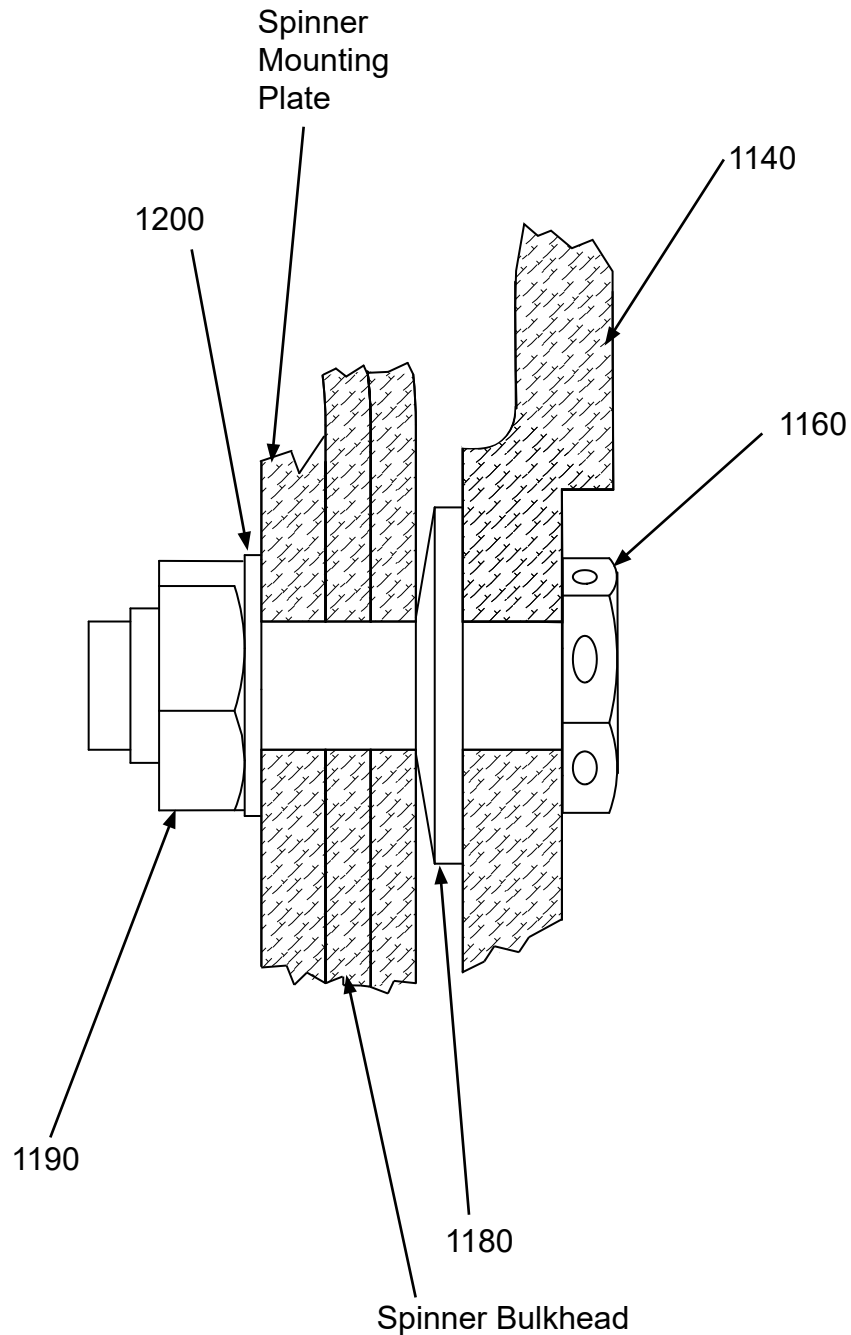
**102195-1**

**BZ.    Installation Instruction 11BZ - continued**

- (12) Tighten all the tie straps (910, 920, and 930).
- (13) Position one tie strap (910) around the bottom of the de-ice boot as shown in Figure BZ-2.
- (14) Using screws (220), washers (200), attach the terminal strip (170) to the bulkhead in accordance with Figure BZ-3.
- (15) Torque 10-12 in. lb. (1.12-1.35 N•m).
- (16) Install the slip ring lead wires and de-ice wire harness (890) to the terminal strip (170) in accordance with Figure BZ-3.
  - (a) Tighten the terminal screws until snug.
- (17) Install the clamp (590), around the wire harness (890) as shown in Figure BZ-4.
- (18) Using screws (610), washers (610 and 630), and nuts (600) install the loop clamp (590) to the bulkhead in accordance with Figure BZ-4.
  - (a) Orient the centerline of the clamp (590) parallel to terminal strip (170).
- (19) Torque the screw (610) to 22-25 in. lbs. (2.48-2.82 N•m).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

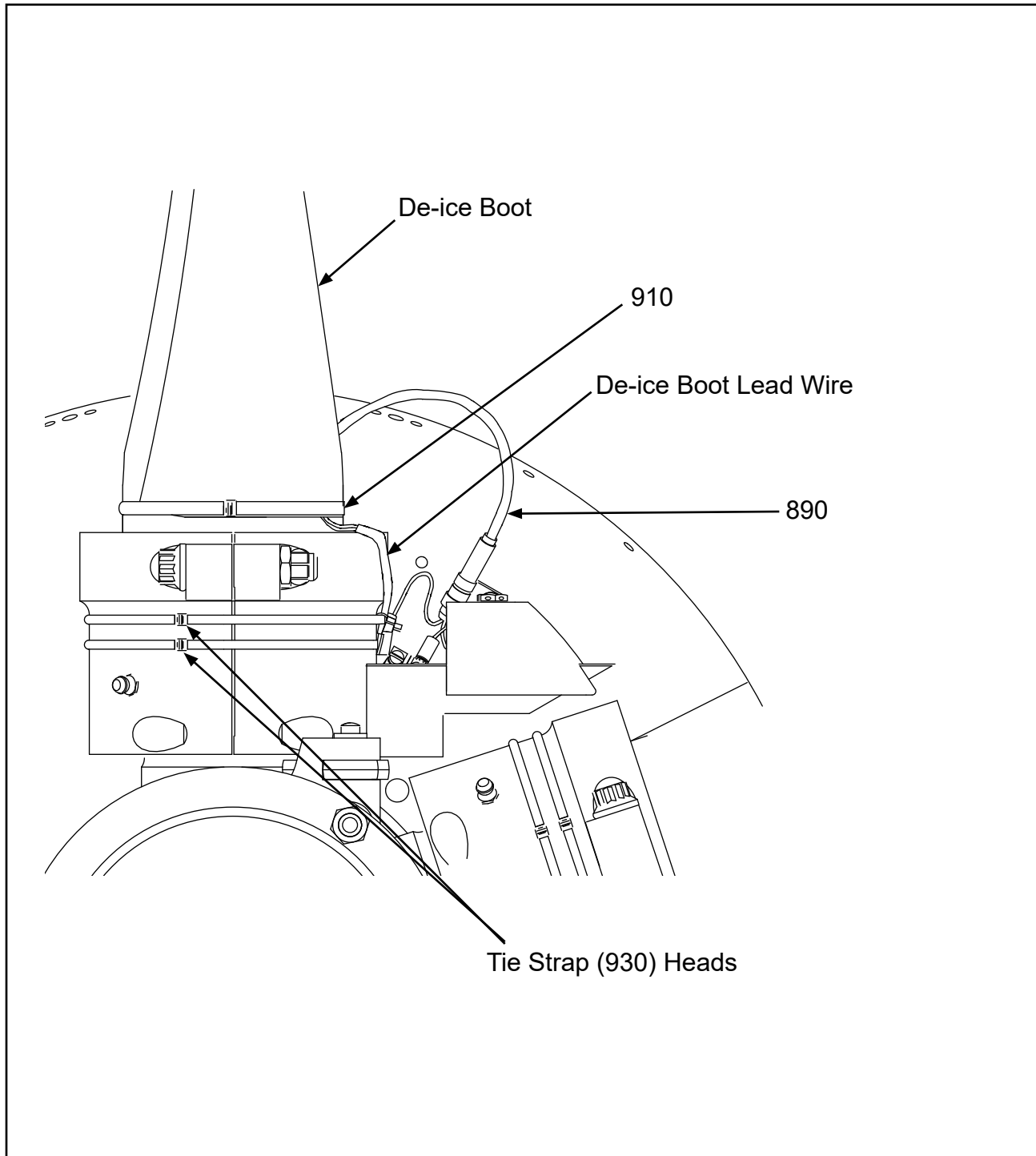
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**102195-1**



**Slip Ring Mounting  
Figure BZ-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

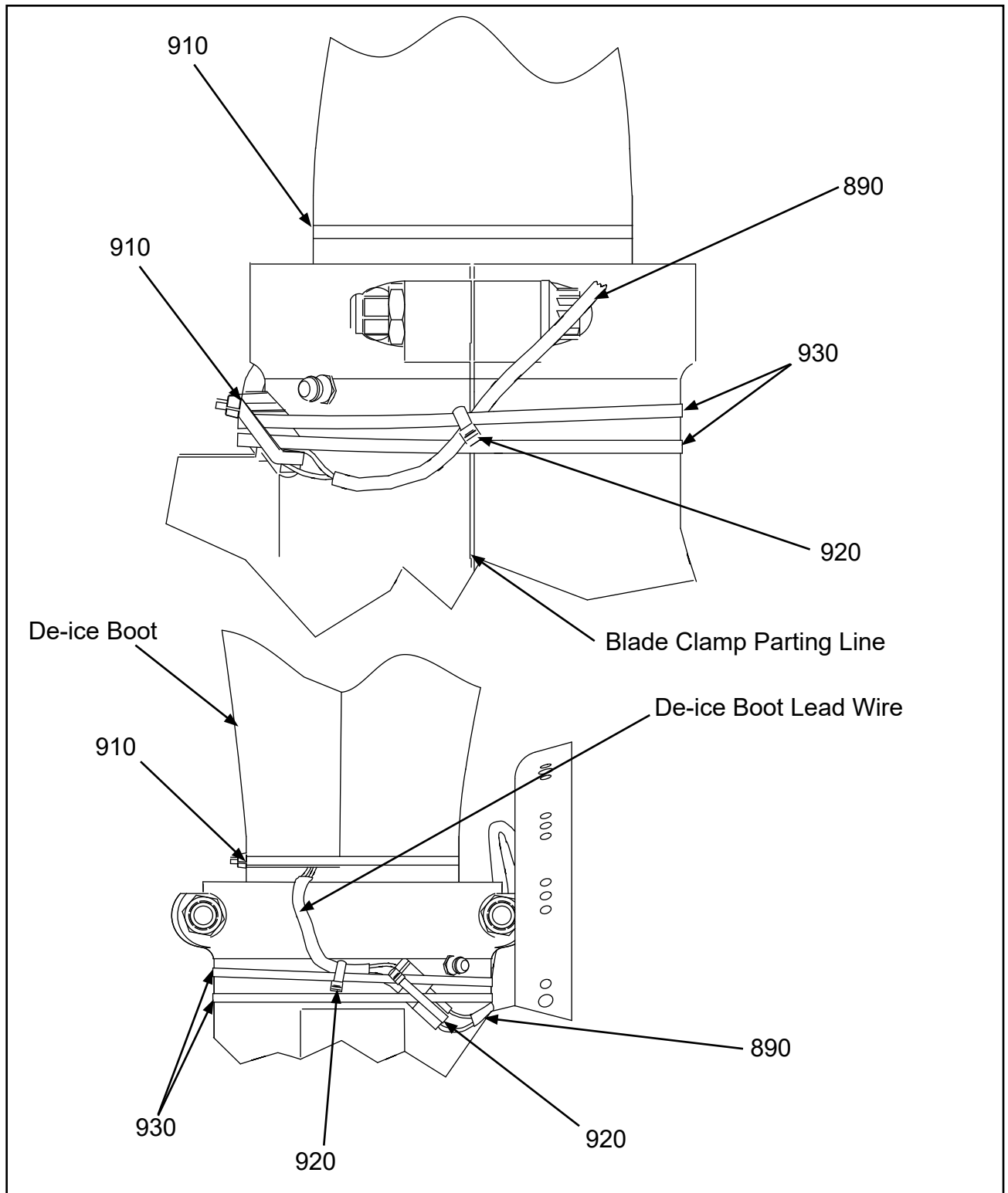
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**102195-1**



**Wire Harness and Tie Strap to Clamp  
Figure BZ-2, page 1 of 2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**102195-1**

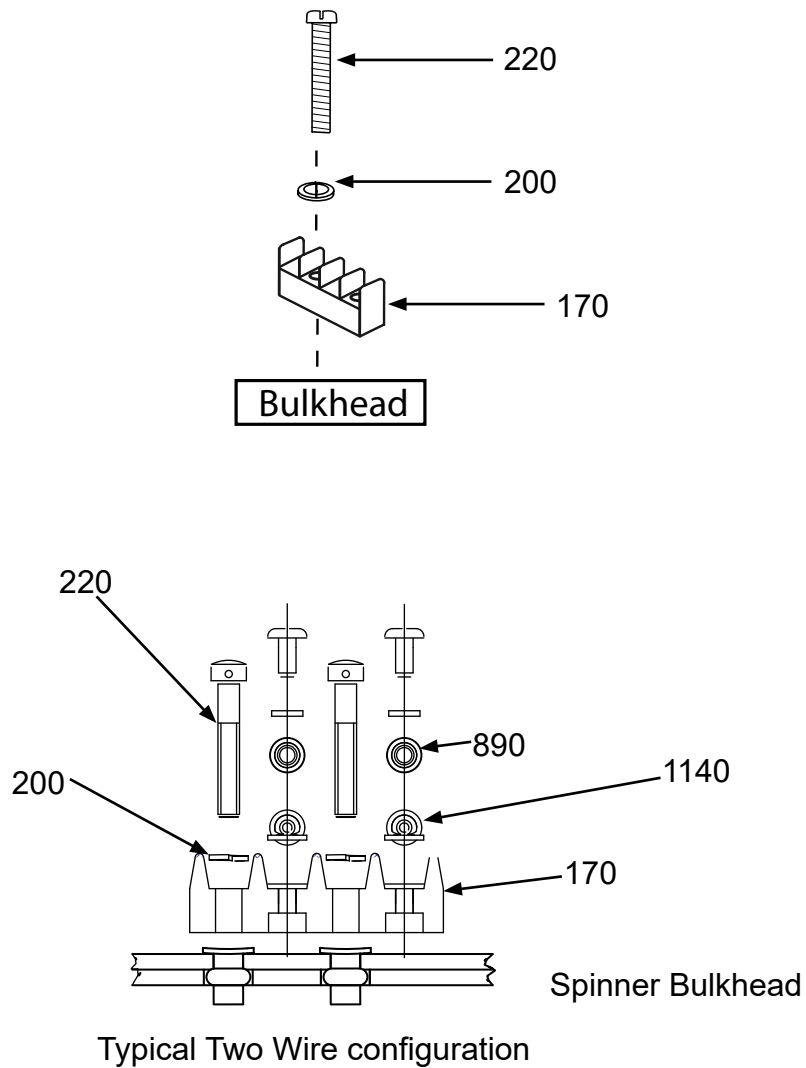


**Wire Harness and Tie Strap to Clamp**  
**Figure BZ-2, page 2 of 2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**102195-1**

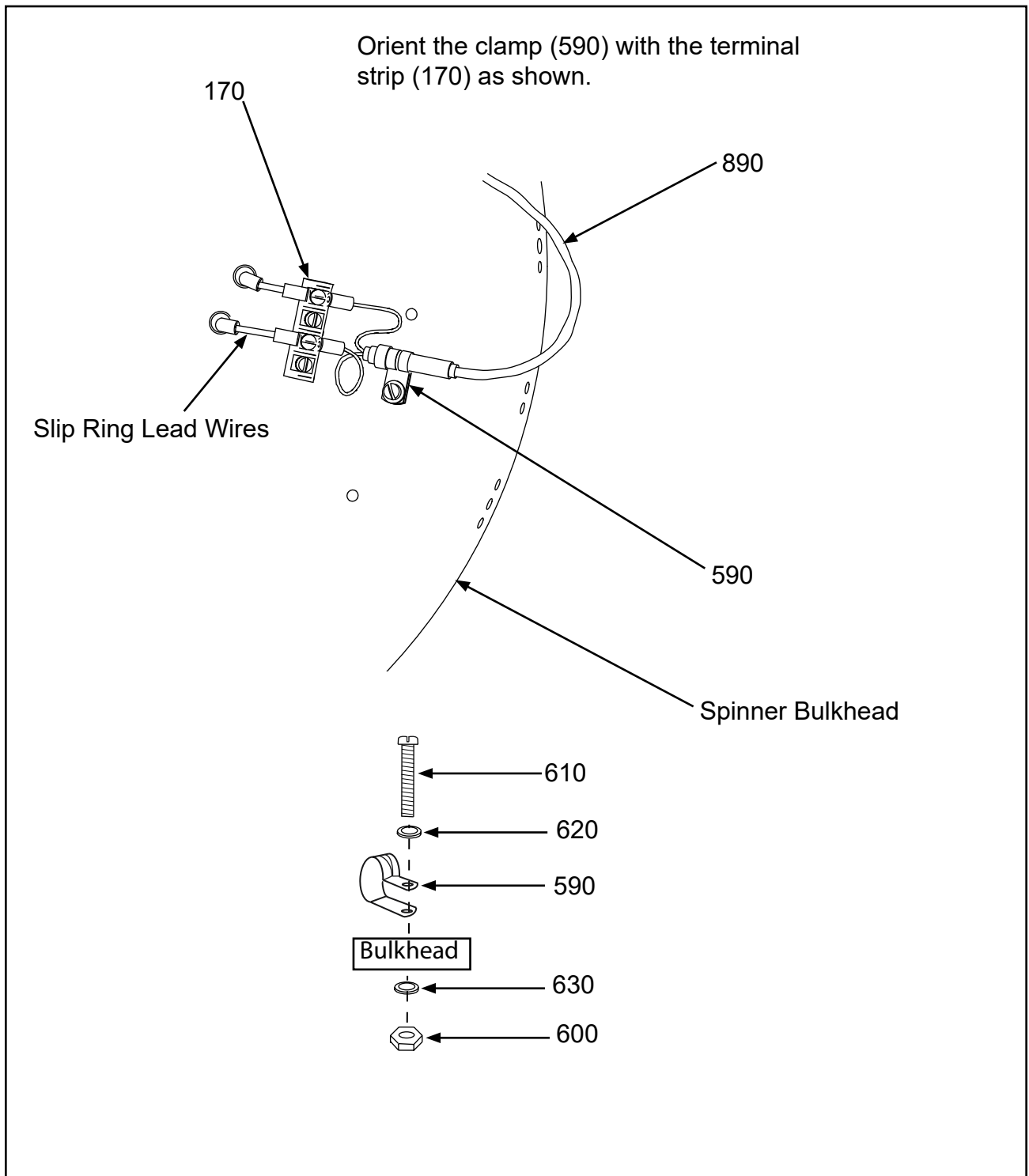


**Terminal Strip  
Figure BZ-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**102195-1**



**Loop Clamp to Bulkhead  
Figure BZ-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**102195-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>102195-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11BZ FIGURES: BZ-1 thru BZ-4</b>		
170	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM	5	
200	B-3854-41	• WASHER, LOCK	10	Y
220	B-6631-233	• SCREW, 6-32, FILLISTER HEAD, CRES	10	Y
590	B-6735	• CLAMP, LOOP, CUSHIONED	5	Y
600	B-6655-08	• NUT, HEX, SELF-LOCKING	5	Y
610	B-3856-246	• SCREW, 8-32, WASHER HEAD	5	Y
620	B-3837-N832	• WASHER, CORROSION RESISTANT	5	Y
630	B-3854-42	• WASHER, CORROSION RESISTANT	5	Y
890	3H2092-2	• WIRE HARNESS	5	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	5	Y
920	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	15	Y
930	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	10	Y
1140	4H2511	• SLIP RING ASSEMBLY	1	
1160	B-3384-8H	• BOLT, 1/4-28, HEX HEAD	10	Y
1180	B-7077-52	• BELLEVILLE SPRING WASHER	10	Y
1190	B-3808-4	• NUT, HEX, SELF-LOCKING	10	Y
1200	B-3837-0432	• WASHER, CORROSION RESISTANT	10	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 102195-1**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**102284-1**

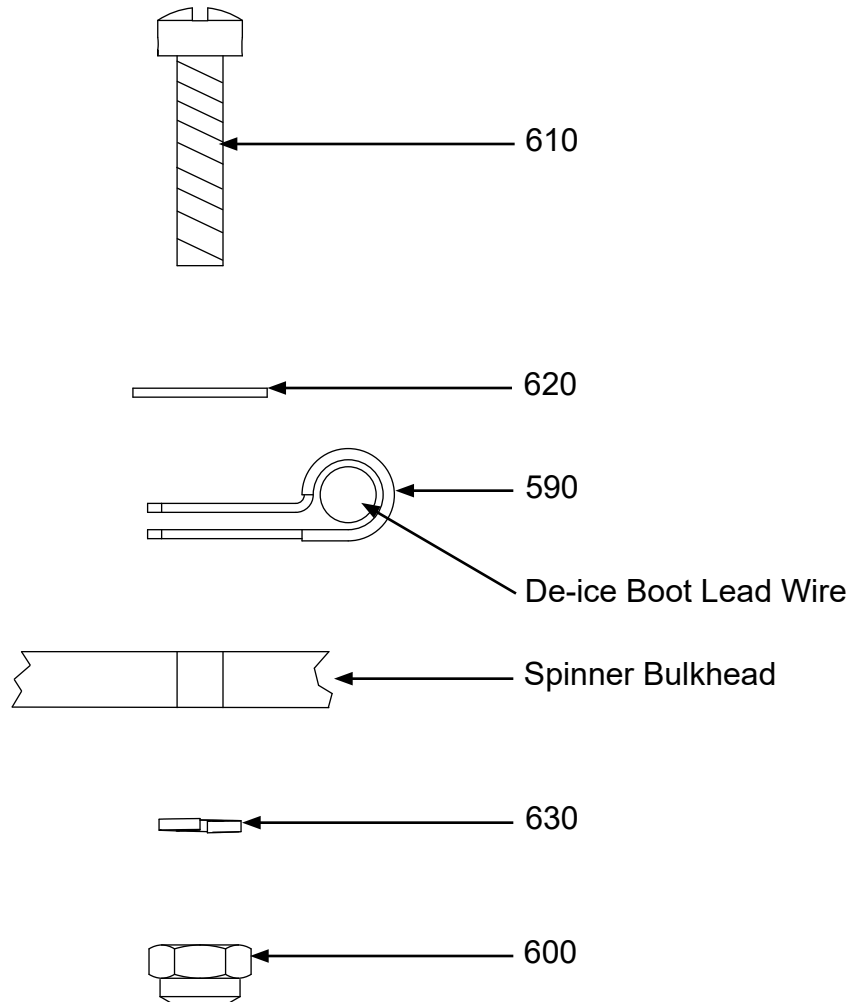
**CA. Installation Instruction 11CA**

- (1) Using the clamp (590) to attach the de-ice boot lead wire to the bulkhead. Torque the nut to 22-25 ft. lb. (29-33 N•m). Refer to Figure CA-1 and Figure CA-2. Twisting of the wires is not permitted.
- (2) Connect the de-ice boot lead wires and the slip ring lead wires to the bulkhead in accordance with Figure CA-3 and Figure CA-4.
- (3) Torque the nut (300) and nut (305) to 6-8 in. lbs. (0.6-0.9 N•m).
- (4) Torque the nut (305) to 10-12 in. lbs. (1.1-1.3 N•m).
- (5) Using the hardware supplied with the slip ring assembly, install the terminal ends of the slip ring wire harness (895) onto the terminal studs of the slip ring with the lead angle opposite the crankshaft rotation as shown in Figure CA-5. This will reduce the stress on the leads during engine operation.
- (6) Torque 10-12 in. lb. (1.1-1.3 N•m).
- (7) Attach slip ring wire harness (895) to hub with tie straps (1820) as shown in Figure CA-6.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**102284-1**



**Loop Clamp to Bulkhead Attachment  
Figure CA-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

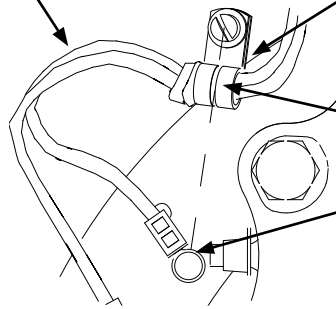
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**102284-1**

De-ice Boot  
Lead Wire

590

Orient the clamp through centerline of  
the closest de-ice hole.



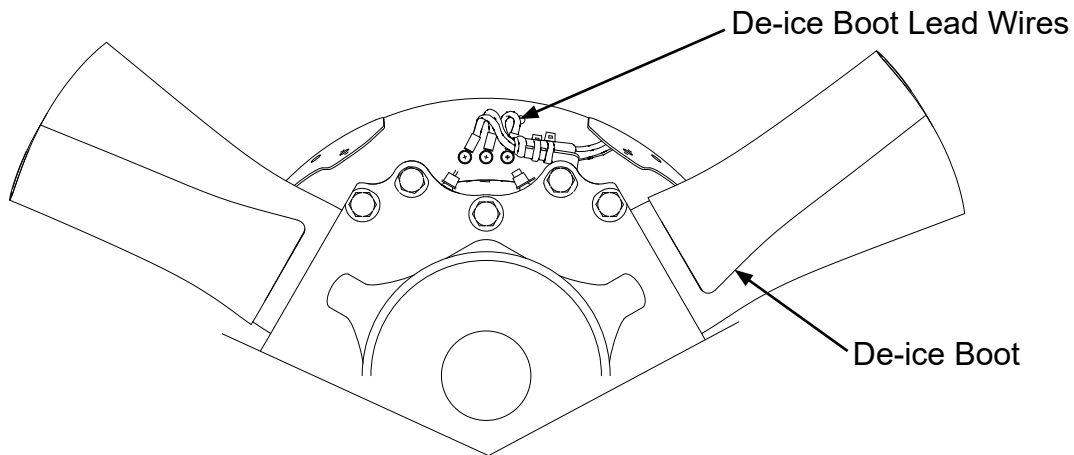
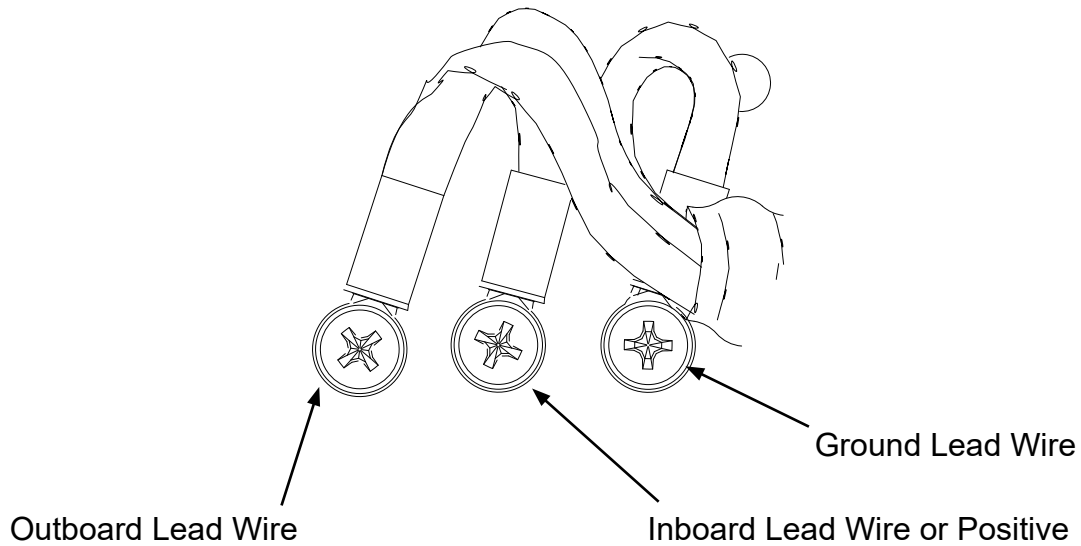
**Loop Clamp Orientation  
Figure CA-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**102284-1**

Two blades installations use the Ground and Positive positions.

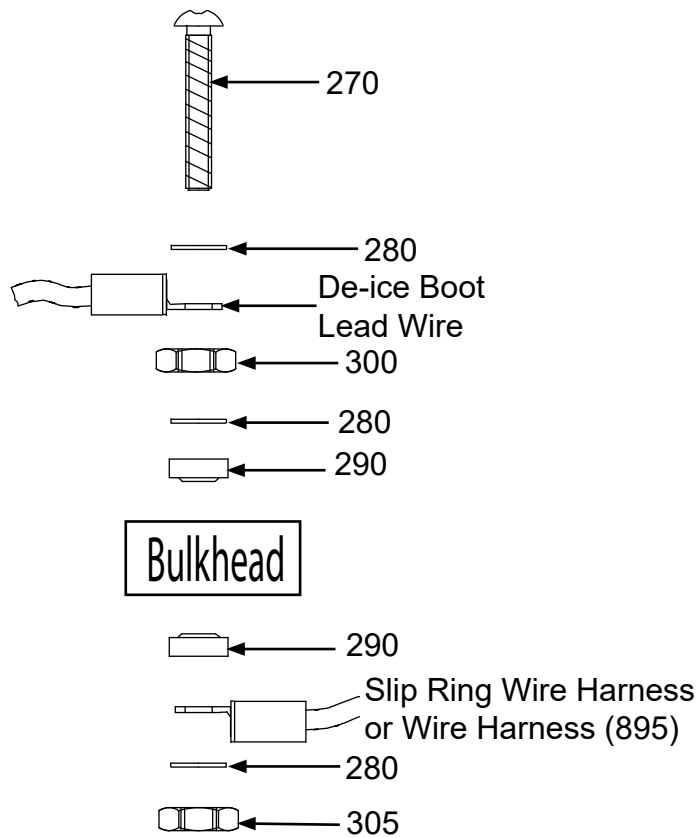


**De-ice Boot Lead Wire Attachment to Bulkhead  
Figure CA-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**102284-1**

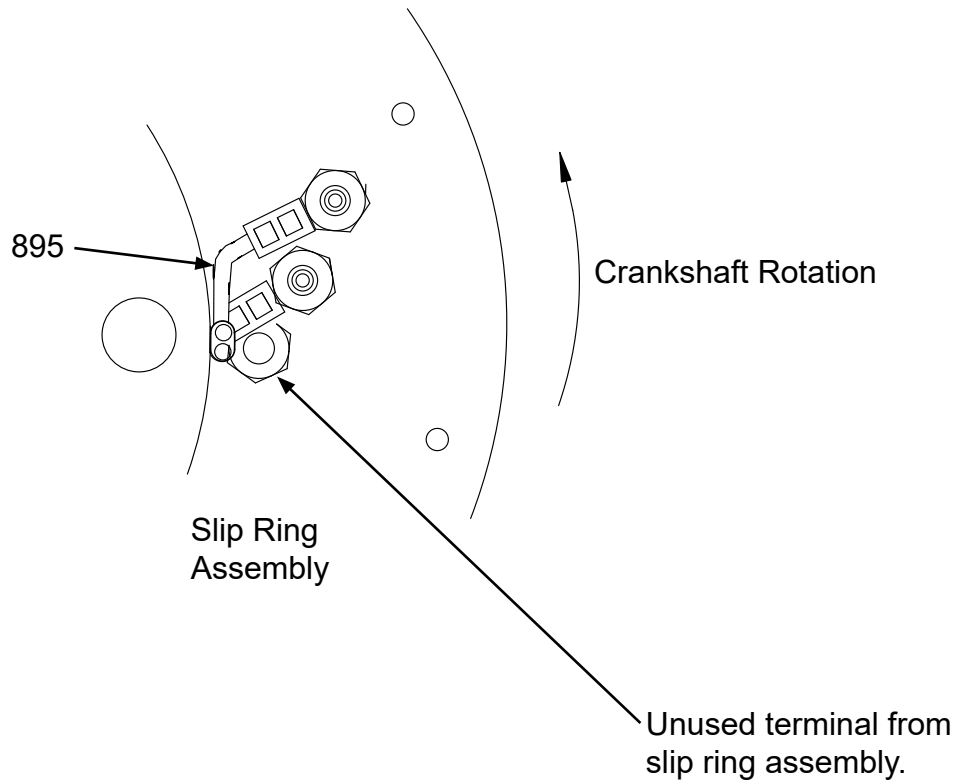


**De-ice Boot Lead Wire and Slip Ring Lead Wire or Wire Harness to Bulkhead  
Figure CA-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**102284-1**

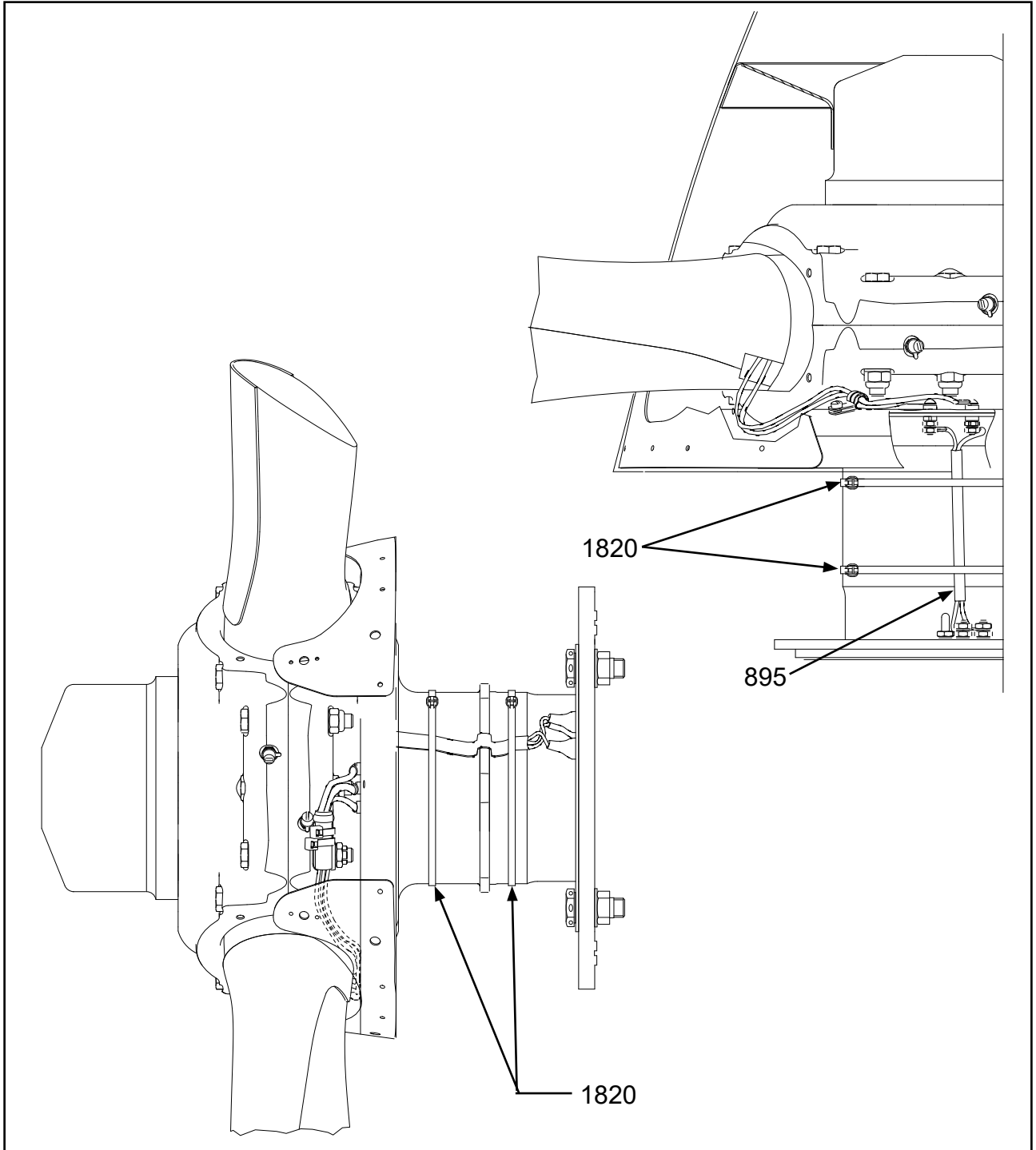


**Slip Ring Wire Harness Attachment to Slip Ring  
Figure CA-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**102284-1**



**Securing Slip Ring Lead Wire or Wire Harness to Hub  
Figure CA-6**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**102284-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>102284-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11CA</b> <b>FIGURES: CA-1 thru CA-6</b>		
590	B-6735-1	• CLAMP, LOOP, CUSHIONED	3	Y
600	B-6655-08	• NUT, HEX, SELF-LOCKING	3	Y
610	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES.	3	Y
620	B-3837-N832	• WASHER, CORROSION RESISTANT	3	Y
630	B-3854-42	• WASHER, LOCK	3	Y
895	102292	• WIRE HARNESS, SLIP RING	3	
1820	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	2	Y
270	B-7035-14	• SCREW, 6-32, PAN HEAD, BRASS	6	
280	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	18	
290	2H1260	• BUSHING, INSULATING	12	
300	B-6641-265	• NUT, HEX, BRASS	6	
305	102856-C06	• NUT, HEX, BRASS	6	

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 102284-1**



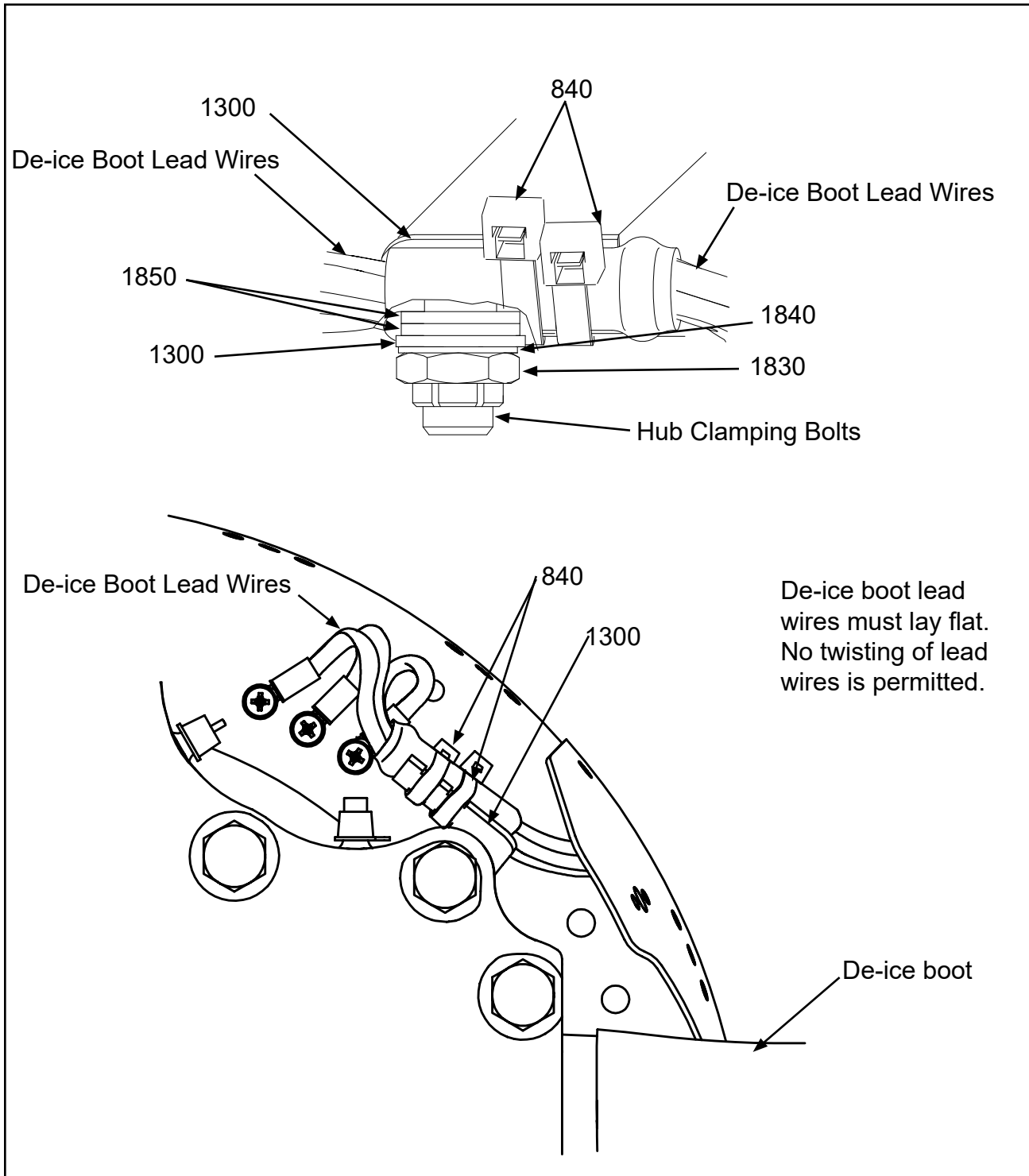
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**102418-(1,3), 102998-1, and 103262**

**CB. Installation Instruction 11CB**

- (1) Install the bracket (1300) under the hub clamping bolt and align as shown in Figure CB-1.
  - (a) Torque the nut 22-25 ft. lb. (29-33 N•m).
- (2) Make sure the de-ice boot lead wires lay flat against the bulkhead as shown in Figure CB-2. Twisting of the lead wires is not permitted.
- (3) Position the de-ice boot lead wire on the bracket (1300) and install the tie straps (840) as shown in Figure CB-1.
- (4) Connect the de-ice boot lead wires and the slip ring lead wires to the bulkhead in accordance with Figure CB-3 and Figure CB-4.
  - (a) Torque the nut (300) to 6-8 in. lbs. (0.6-0.9 N•m).
  - (b) Torque the nut (305) to 10-12 in. lbs. (1.1-1.3 N•m).
- (5) If required, use the hardware supplied with the slip ring assembly and install the terminal ends of the slip ring wire harness (895) onto the terminal studs of the slip ring, as shown in Figure CB-5.
  - (a) Torque the screw to 10-12 in. lb. (1.1-1.3 N•m).
- (6) Using tie straps (1820) to attach the slip ring wire harness (895) or lead wires to the hub as shown in Figure CB-2.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

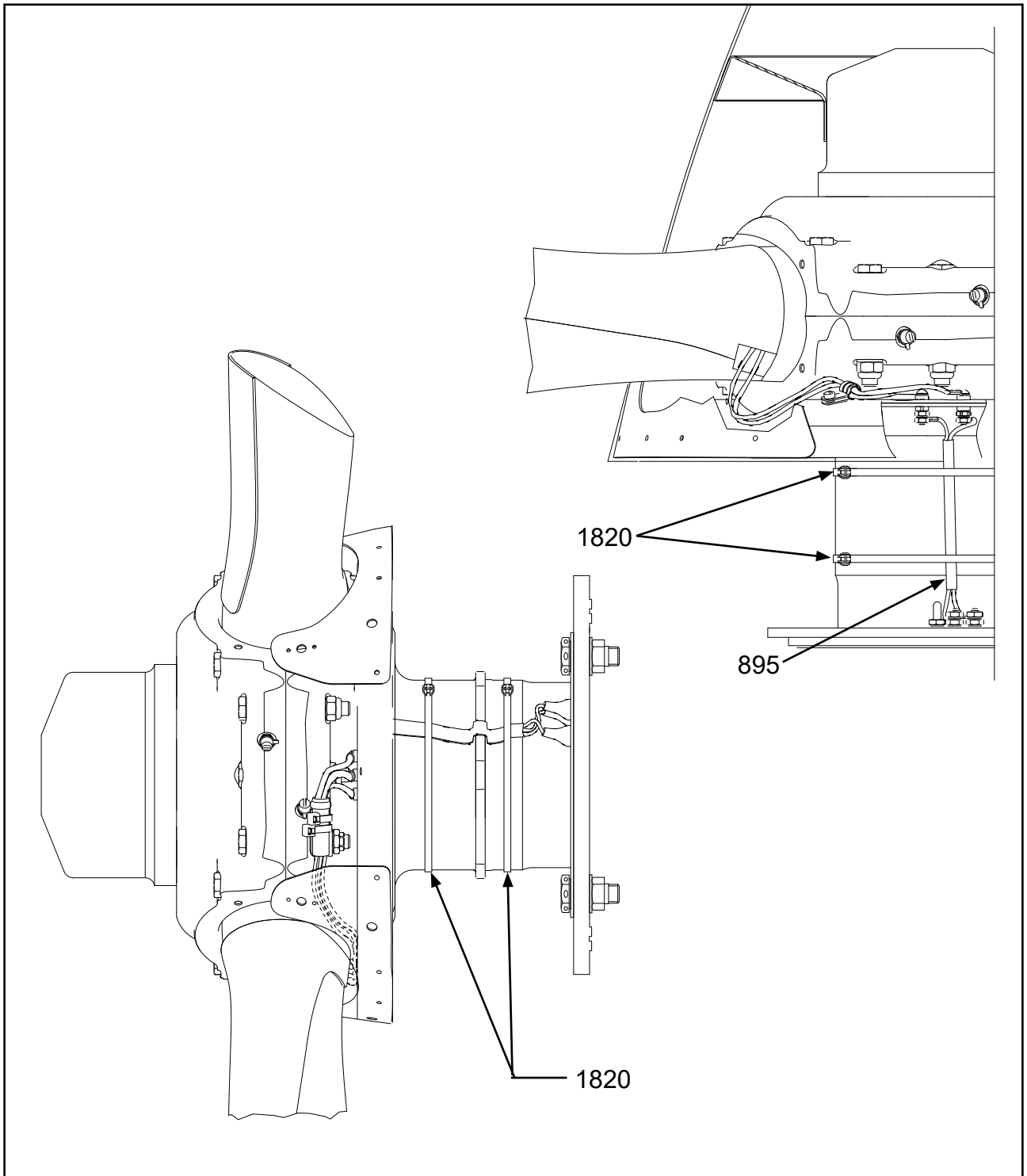
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**102418-(1,3), 102998-1, and 103262**



**De-ice Boot Lead Wire Bracket  
Figure CB-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**102418-(1,3), 102998-1, and 103262**

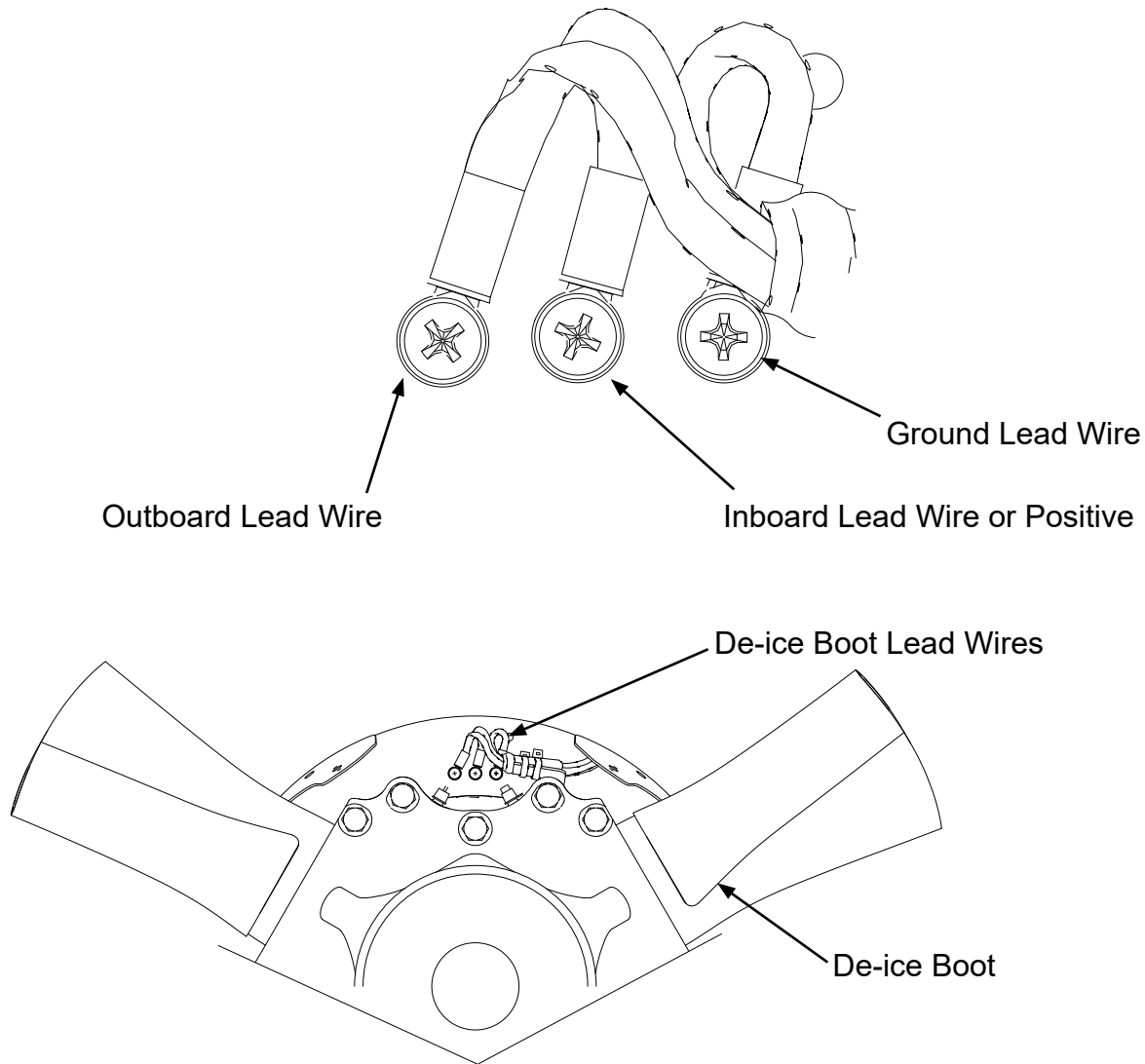


**Securing Slip Ring Lead Wire or Wire Harness to Hub  
Figure CB-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**102418-(1,3), 102998-1, and 103262**

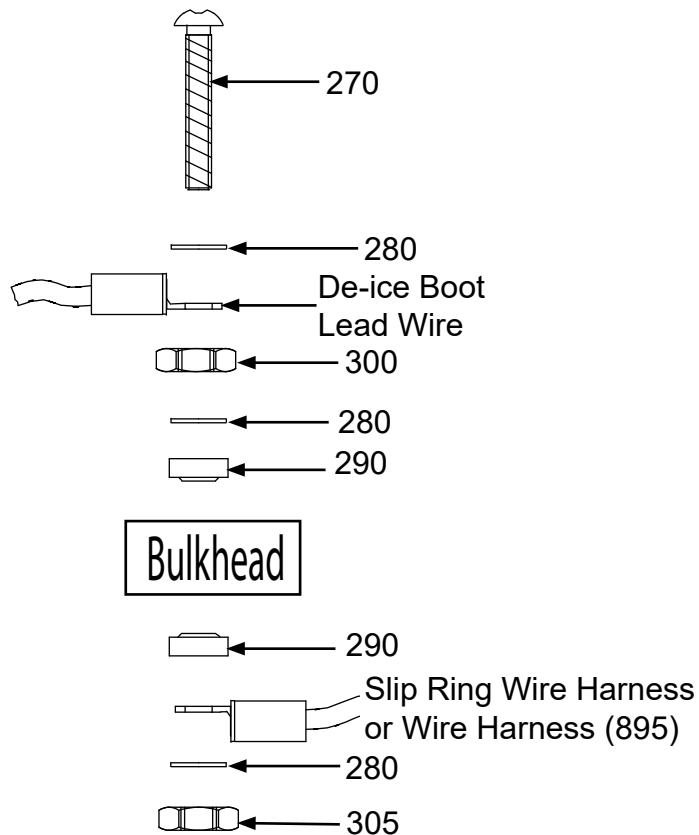
Two blades installations use the Ground and Positive positions.



**De-ice Boot Lead Wire Attachment to Bulkhead  
Figure CB-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

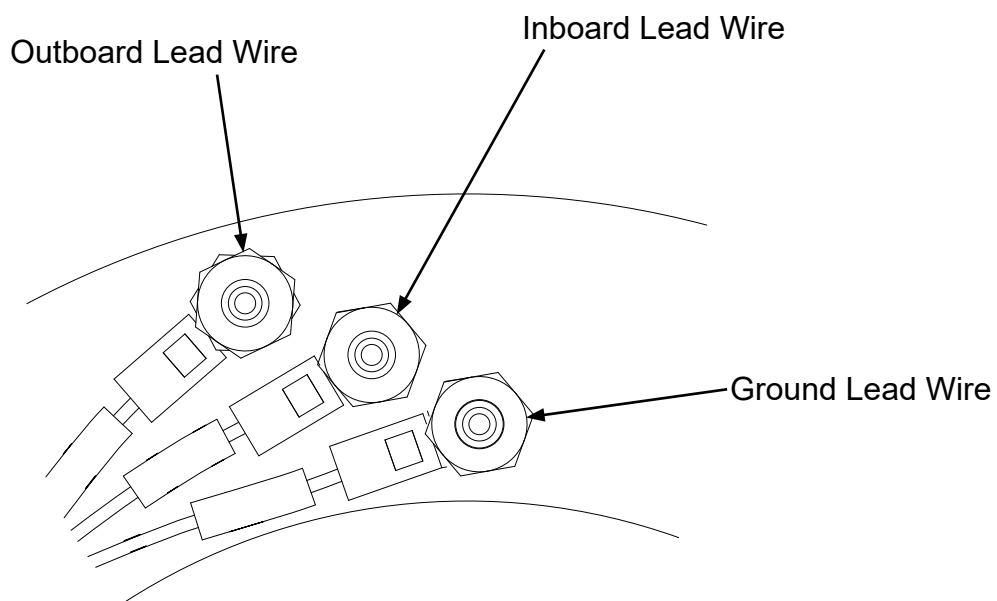
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**102418-(1,3), 102998-1, and 103262**



**De-ice Boot Lead Wire/Slip Ring Lead Wire Hardware  
Figure CB-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**102418-(1,3), 102998-1, and 103262**



**Slip Ring Wire Harness Attachment to Slip Ring  
Figure CB-5**

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**102418-(1,3), 102998-1, and 103262**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>102418-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11CB</b> <b>FIGURES: CB-1 thru CB-5</b>		
895	102451	• WIRE HARNESS, SLIP RING	3	
1820	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	2	Y
840	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	6	Y
1300	B-6265	• BRACKET, WIRE HARNESS	3	
1830	B-3599	• NUT, 3/8-24, HEX, SELF-LOCKING	3	Y
1840	B-3834-0632	• WASHER	3	Y
1850	B-3834-0663	• WASHER	6	Y
270	B-7035-12	• SCREW, 6-32, PAN HEAD, BRASS	9	
280	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	27	
290	2H1260	• BUSHING, INSULATING	18	
300	B-6641-265	• NUT, HEX, BRASS	9	
305	B-6641-265	• NUT, HEX, BRASS	9	
	<b>102418-3</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11CB</b> <b>FIGURES: CB-1 thru CB-5</b>		
895	102451	• WIRE HARNESS, SLIP RING	3	
1820	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	2	Y
840	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	6	Y
1300	B-6265	• BRACKET, WIRE HARNESS	3	
1830	B-3599	• NUT, 3/8-24, HEX, SELF-LOCKING	3	Y
1840	B-3834-0632	• WASHER	3	Y
1850	B-3834-0663	• WASHER	6	Y
270	B-7035-12	• SCREW, 6-32, PAN HEAD, BRASS	9	
280	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	27	
290	2H1260	• BUSHING, INSULATING	18	
300	B-6641-265	• NUT, HEX, BRASS	9	
305	B-6641-265	• NUT, HEX, BRASS	9	
5400	102352	• DE-ICE BOOT	3	

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 102418-1 and 102418-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**102418-(1,3), 102998-1, and 103262**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>102998-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION CB</b> <b>FIGURES: CB-1 thru CB-5</b>		
1820	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	2	Y
840	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	6	Y
1300	B-6265	• BRACKET, WIRE HARNESS	3	
1830	B-3599	• NUT, 3/8-24, HEX, SELF-LOCKING	3	Y
1840	B-3834-0632	• WASHER	3	Y
1850	B-3834-0663	• WASHER	6	Y
270	B-7035-14	• SCREW, 6-32, PAN HEAD, BRASS	9	
280	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	27	
290	2H1260	• BUSHING, INSULATING	18	
300	B-6641-265	• NUT, HEX, BRASS	9	
305	102856-C06	• NUT, HEX, BRASS	9	
	<b>103262</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11CB</b> <b>FIGURES: CB-1 thru CB-5</b>		
1820	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	2	Y
840	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	6	Y
1300	B-6265	• BRACKET, WIRE HARNESS	3	
1830	B-3599	• NUT, 3/8-24, HEX, SELF-LOCKING	3	Y
1840	B-3834-0632	• WASHER	3	Y
1850	B-3834-0663	• WASHER	6	Y
270	B-7035-14	• SCREW, 6-32, PAN HEAD, BRASS	9	
280	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	27	
290	2H1260	• BUSHING, INSULATING	18	
300	B-6641-265	• NUT, HEX, BRASS	9	
305	102856-C06	• NUT, HEX, BRASS	9	

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 102998-1 and 103262**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**102544-1**

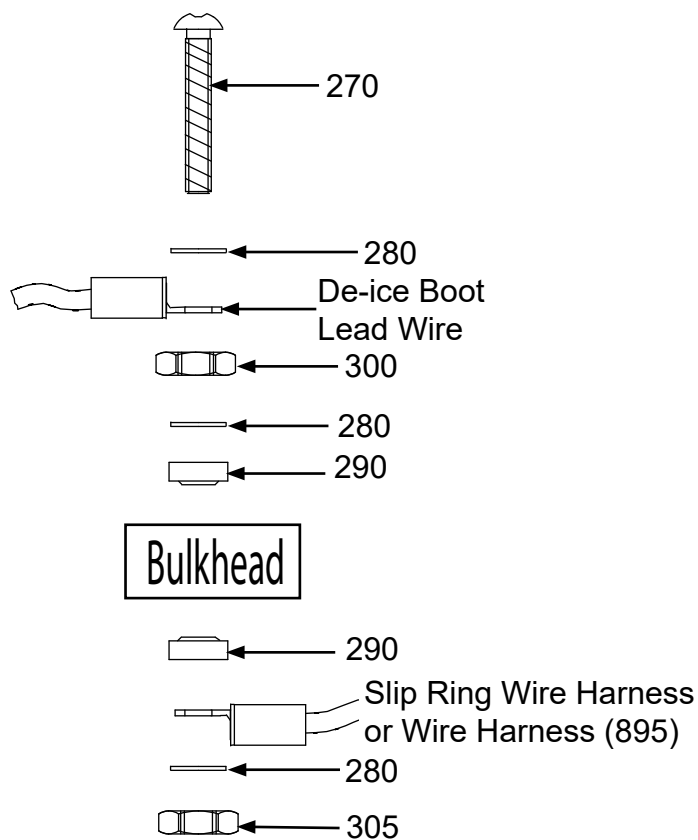
**CC. Installation Instruction 11CC**

- (1) Connect the de-ice boot lead wires and the slip ring lead wires to the bulkhead in accordance with Figure CC-1 and Figure CC-2.
  - (a) Torque the nut (300) and nut (305) to 6-8 in. lbs. (0.6-0.9 N•m).
  - (b) Torque the nut (305) to 10-12 in. lbs. (1.1-1.3 N•m).
- (2) Using the lead clip (360), route the de-ice boot lead strap as shown and attach the de-ice boot lead strap to the bulkhead in accordance with Figure CC-3 and Figure CC-2. Tighten until snug.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

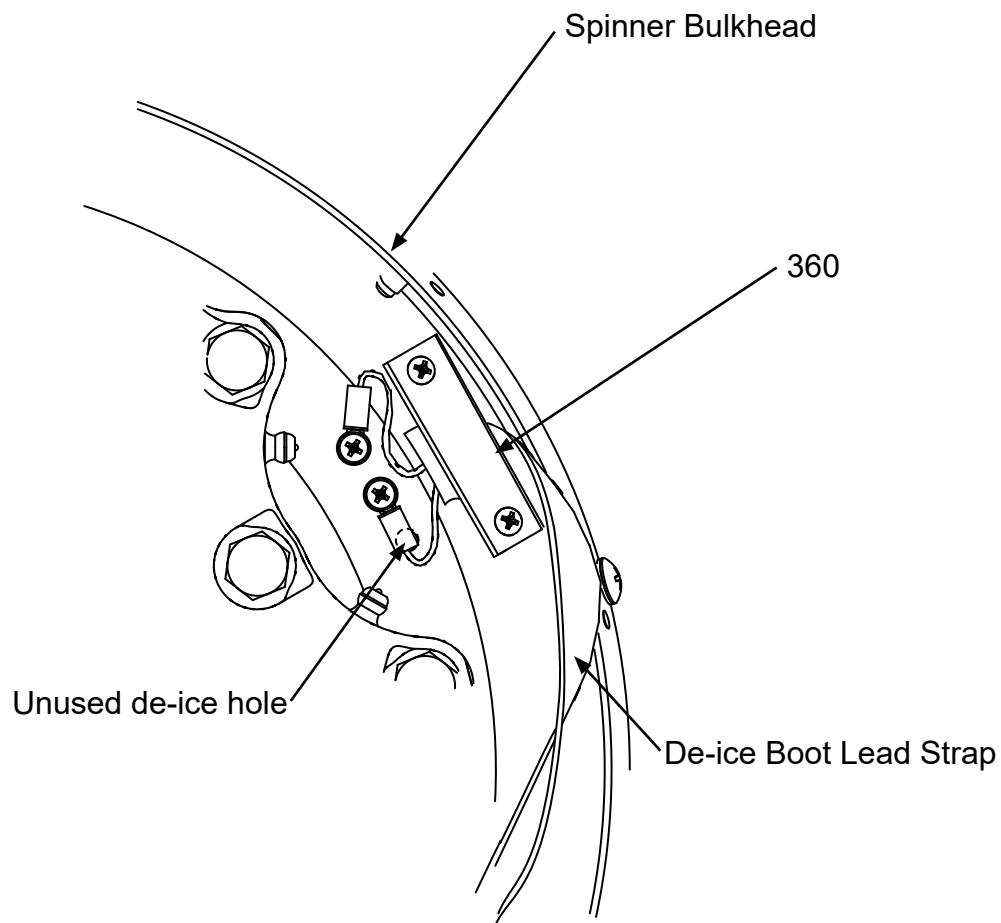
**102544-1**



**De-ice Boot Lead Wire and Slip Ring Lead Wire or Wire Harness to Bulkhead  
Figure CC-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**102544-1**

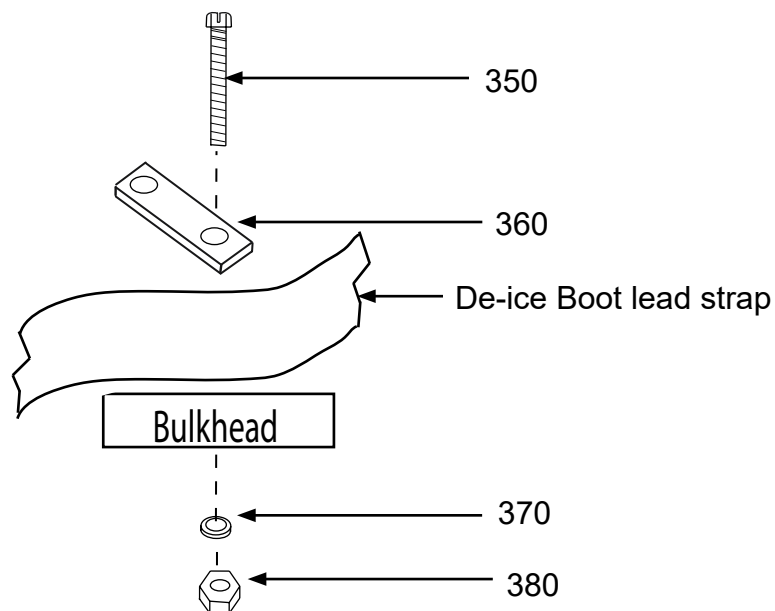


**Lead Clip and De-ice Boot Lead Strap and Lead Wires Attachment to Bulkhead  
Figure CC-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**102544-1**



**Lead Clip Attachment to Bulkhead  
Figure CC-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**102544-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>102544-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11CC</b> <b>FIGURES: CC-1 thru CC-3</b>		
270	B-7035-12	• SCREW, 6-32, PAN HEAD, BRASS	6	
280	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	18	Y
290	2H1260	• BUSHING, INSULATING	12	
300	B-6641-265	• NUT, HEX, BRASS	6	
305	B-6641-265	• NUT, HEX, BRASS	6	
350	B-6637-30	• SCREW, PAN HEAD, CRES.	6	
360	3H1271-2	• CLIP, LEAD STRAP	3	
370	B-3837-N632	• WASHER, CORROSION RESISTANT	6	Y
380	B-6655-06	• NUT, HEX, SELF-LOCKING	6	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 102544-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**102544-1**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**102600-(3,4)**

**CD. Installation Instruction 11CD**

- (1) Position the propeller blades at low blade angle or start lock angle.
- (2) Route the terminal end of the wire harness (890) through the hole in counterweight, as shown in Figure CD-1.
- (3) Assemble the plug connection between the wire harness (890) and the de-ice boot.
- (4) Install and tighten the tie strap (900) around the wire harness/de-ice boot plug connection.
- (5) Position the tie strap head (900) in the approximate location shown in Figure CD-1.
- (6) Install the clear vinyl tubing over the wire harness (890) until the clear vinyl tubing contacts the heat shrink tubing installed on the wire harness (890).
- (7) Install the AMP terminals (975) on the lead wires in accordance with the manufacturer's instructions.
- (8) Secure the wire harness/boot connection to the counterweight.
  - (a) Outboard Tie Strap (910) installation:
    - 1 Install tie straps (910) under the tie strap (900) connecting the wire harness/boot plugs, around the counterweight, and over the wire harness (890) as shown in Figure CD-1.
    - 2 Position the tie strap head in the approximate location shown on the side of the counterweight as shown in Figure CD-1. Do not tighten the tie strap (910) at this time.
  - (b) Inboard Tie Strap (910) installation:
    - 1 Install tie straps (910) under the tie strap (900) connecting the wire harness/boot plugs, around the counterweight, and under the wire harness (890) as shown in Figure CD-1.
    - 2 Position the tie strap head in the approximate location shown on the side of the counterweight as shown in Figure CD-1. Do not tighten the tie strap (910) at this time.
  - (c) Verify that the wire harness (890) is taut through the counterweight hole.
  - (d) Tighten all of the tie straps (900 and 910).
- (9) Put the slip ring assembly (1140) on the engine flange.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**102600-(3,4)**

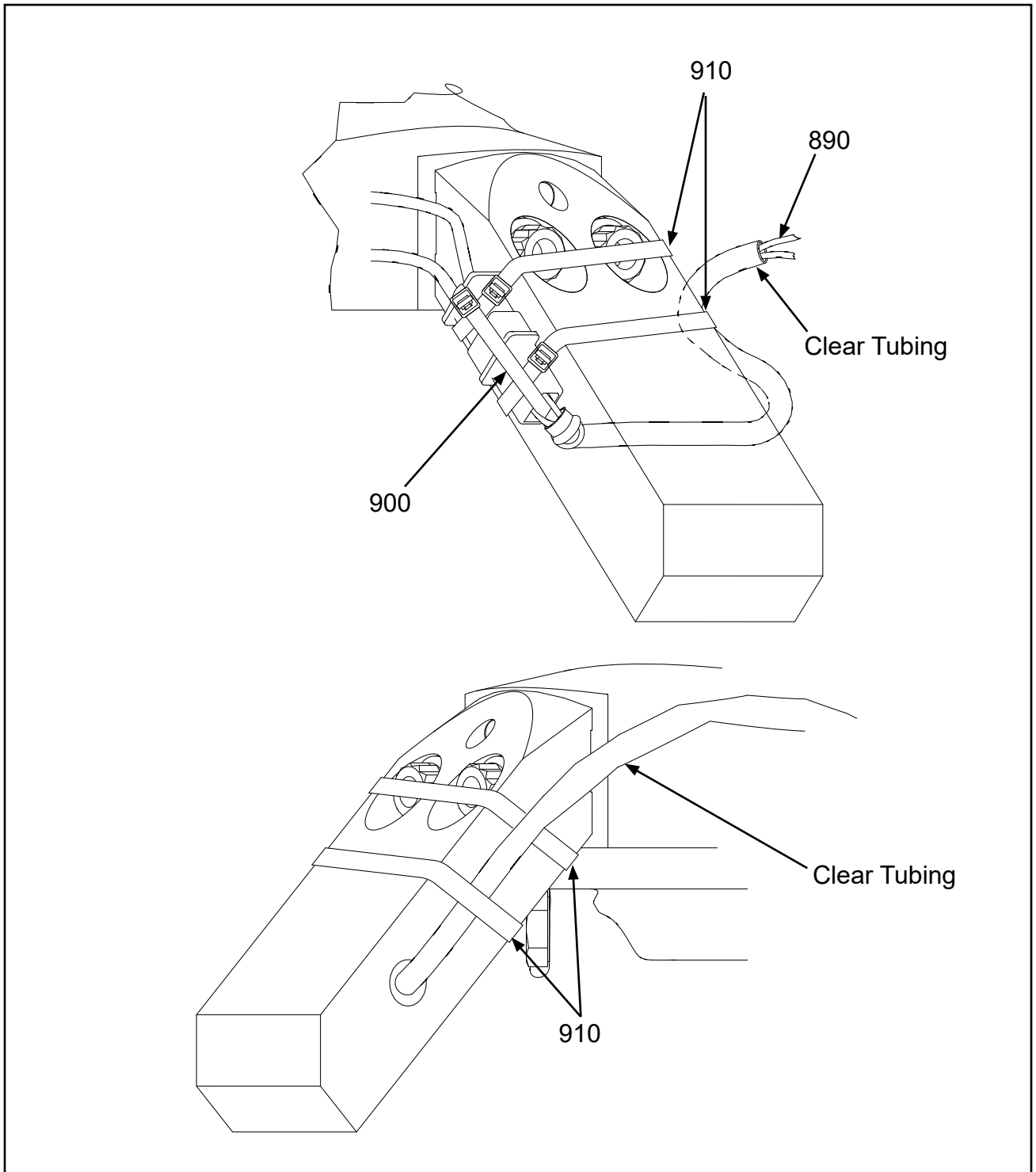
CD. Installation Instruction 11CD - continued

- (10) Using the belleville spring washer (1180), nut (1190) and washer (1210), attach the split mounting plate (1130) to the slip ring assembly (1140) in accordance with Figure CD-2.
- (11) Snug the nut (1190), do not torque at this time.
- (12) Install the propeller on the engine flange in accordance with Hartzell Owner's Manual 115N (61-00-15).
- (13) Using the existing propeller mounting nuts and washers, attach the split mounting plate (1130) slip ring assembly (1140) to the propeller studs extending through the engine flange in accordance with Figure CD-2.
  - (a) The split between the split mounting plates (1130) must be aligned with the propeller dowel pins.
  - (b) Torque the mounting nuts in accordance with the applicable Hartzell Propeller Owner's Manual 115N (61-00-15).
- (14) Torque the bolts (1350) attaching the slip ring assembly (1140) to the split mounting plates (1130) to 40 - 120 in.-lbs. (4.5 - 14 N•m) to achieve slip ring (1140) runout in accordance with the Check chapter of this manual.
- (15) Using the screw (270), washer (280), insulating bushings (290), and nut (300 and/or 305), connect the de-ice wire harness (890) and the slip ring lead wires to the bulkhead in accordance with Figure CD-3.
- (16) Torque the nut (300) to 6-8 in. lbs. (0.6-0.9 N•m) and nut (305) 10-12 in. lbs. (1.1-1.3 N•m).
- (17) Using the lead clip (360), screw (350), washer (370) and nut (380), route the de-ice wire harness (890) as shown and attach to the bulkhead in accordance with Figure CD-4 and Figure CD-5.
- (18) Tighten the nut (380) until snug.



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**102600-(3,4)**

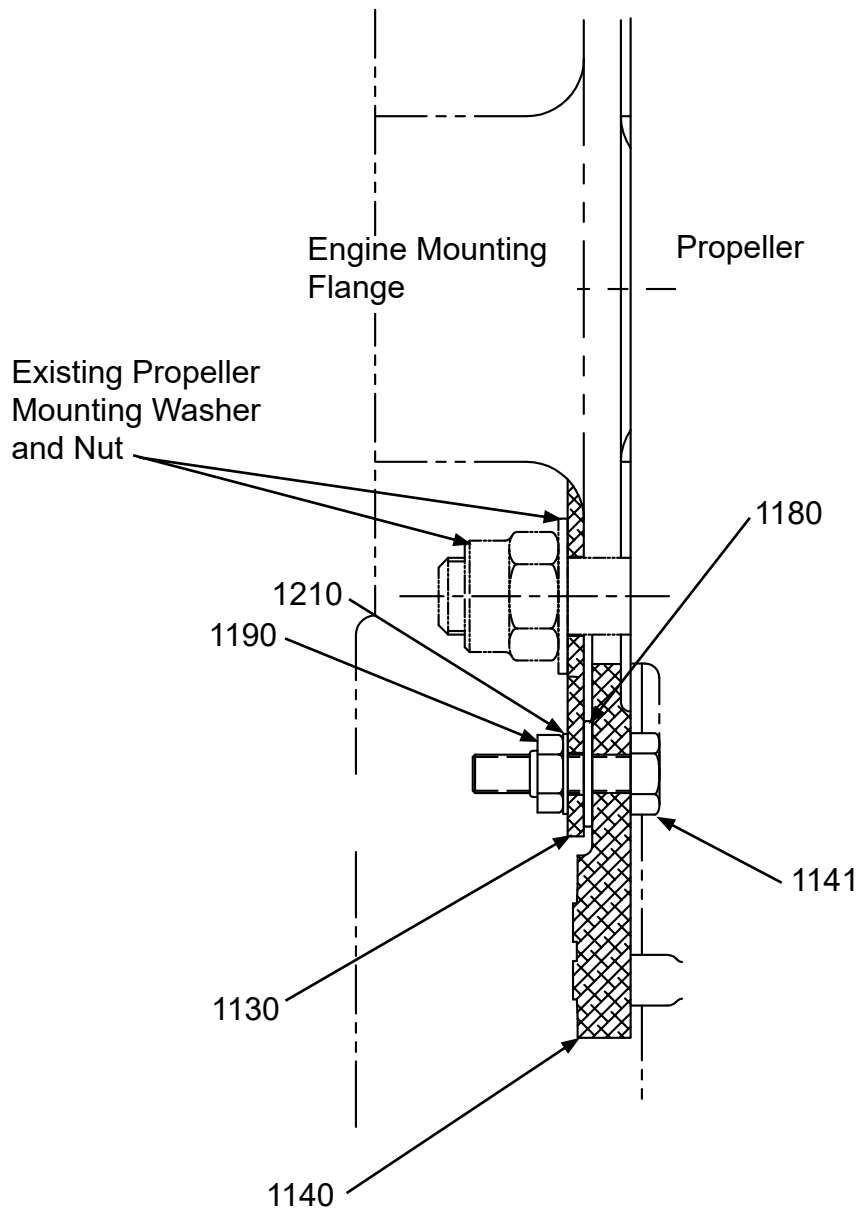


**Wire Harness to Counterweight Attachment  
Figure CD-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**102600-(3,4)**

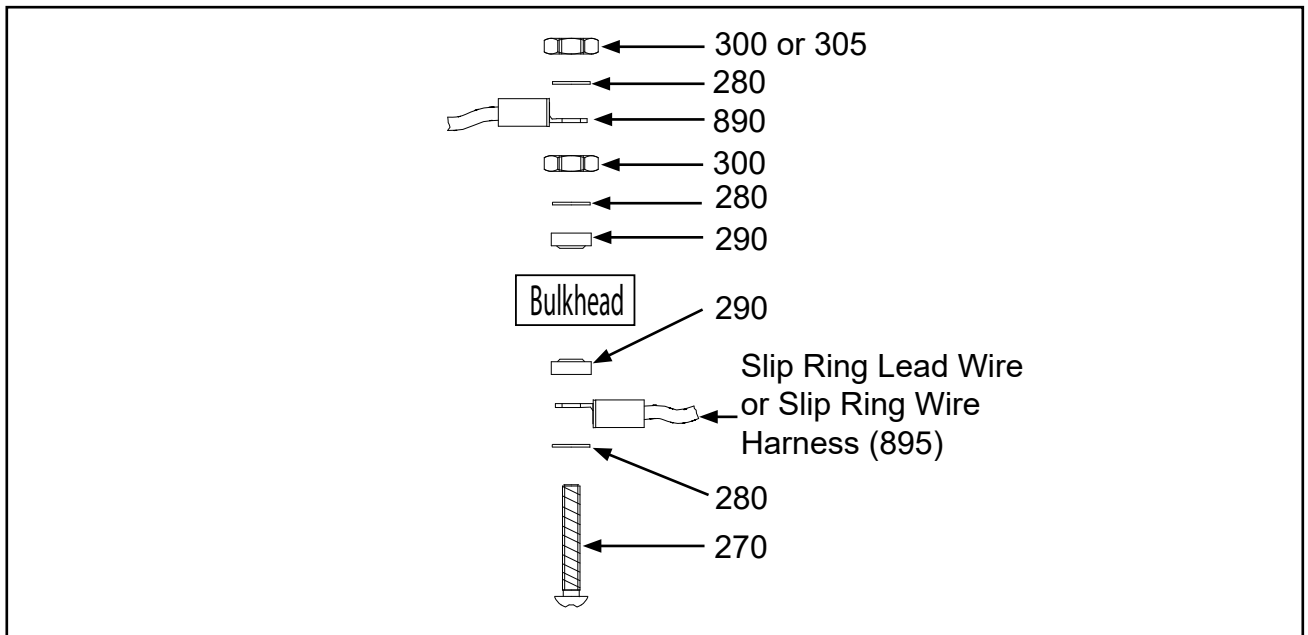


**Slip Ring Mounting  
Figure CD-2**

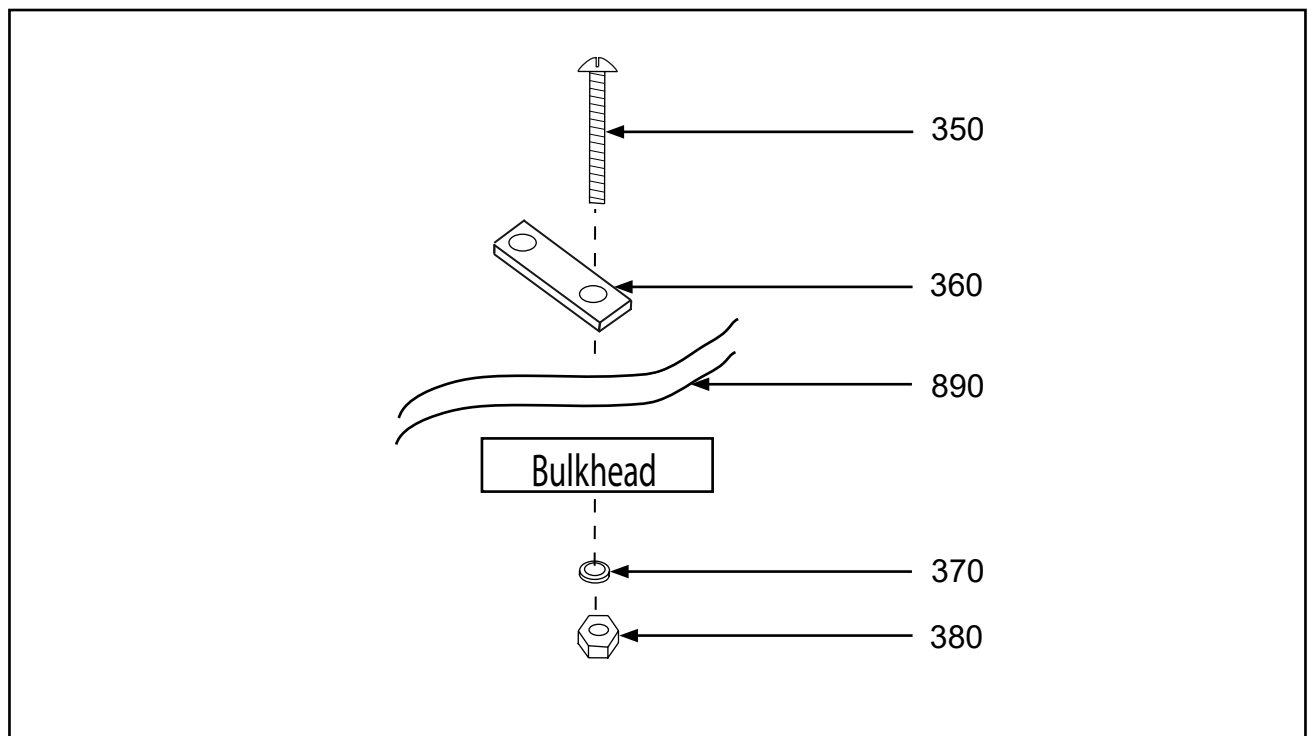
**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**102600-(3,4)**



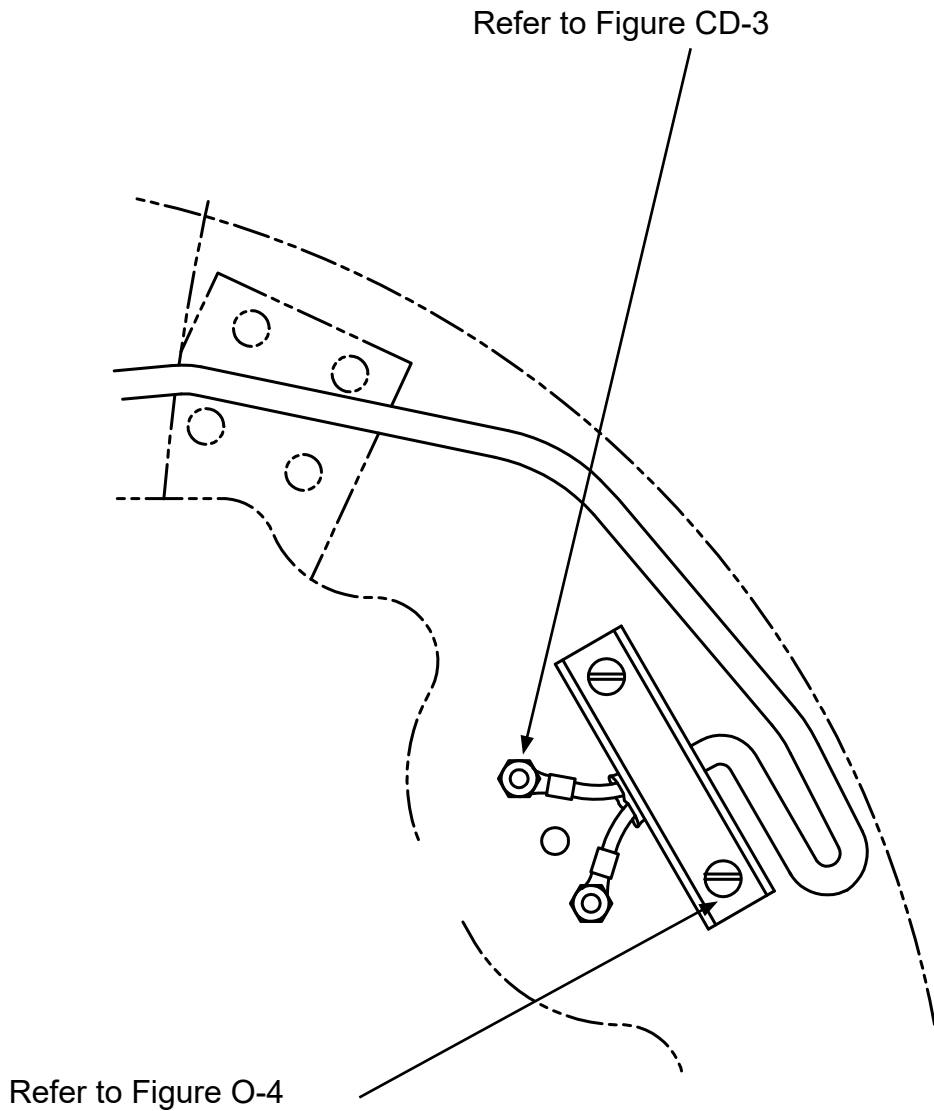
**Securing De-ice Wire Harness and Slip Ring Lead Wire to Bulkhead  
Figure CD-3**



**Lead Clip Attachment to Bulkhead  
Figure CD-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**102600-(3,4)**



Lead wires may have two or 3 terminal ends.

**De-ice Wire Harness Routing  
Figure CD-5**

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**102600-(3,4)**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>102600-3</b>	<b>PROPELLER AND AIRFRAME DE-ICE KIT PER AIRCRAFT - 2 BLADE HARTZELL TO 3 BLADE HARTZELL INSTALLATION INSTRUCTION 11CD FIGURES: CD-1 thru CD-5</b>		
270	B-7035-14	• SCREW, 6-32, PAN HEAD, BRASS	12	
280	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	36	Y
290	2H1260	• INSULATING BUSHING	24	
300	B-6641-265	• NUT, HEX, BRASS	24	Y
350	B-6637-30	• SCREW, PAN HEAD, CRES.	12	
360	3H1271-2	• CLIP, LEAD STRAP	6	
370	B-3837-N632	• WASHER, CORROSION RESISTANT	12	Y
380	B-6655-06	• NUT, HEX, SELF-LOCKING	12	Y
890	3H2050	• WIRE HARNESS	6	Y
900	B-3852-1-0	• • STRAP, TIEDOWN, PLASTIC	1	Y
910	B-3852-2-0	• • STRAP, TIEDOWN, PLASTIC	2	Y
975	101902	• • TERMINAL, RING	2	
975A	7931-320619	• • AMP 320619 PIDG RING TERMINAL ALTERNATE FOR ITEM 975	2	
975B	7931-2-320619-1	• • AMP 320619 PIDG RING TERMINAL ALTERNATE FOR ITEM 975	2	
	SAE-AMS-I-7444	• • CLEAR VINYL TUBING		
1130	4H3153	• MOUNTING PLATE, SPLIT	1	
1140	4H2422	• SLIP RING ASSEMBLY	1	
1141	102044-4-16	• SCREW, HEX HEAD, 1/4-28	AR	
1180	B-7077-52	• BELLEVILLE SPRING WASHER	12	Y
1190	B-3808-4	• NUT, HEX, SELF-LOCKING	12	
1210	B-3837-0463	• WASHER, CORROSION RESISTANT	12	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 102600-3, page 1 of 2**

## 1

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De-ice Kit(s): 102600-3, page 2 of 2

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**102600-(3,4)**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>102600-4</b>	<b>PROPELLER AND AIRFRAME DE-ICE KIT PER AIRCRAFT - 3 BLADE MCCAULEY TO 3 BLADE HARTZELL INSTALLATION INSTRUCTION 11CD FIGURES: CD-1 thru CD-5</b>		
270	B-7035-14	• SCREW, 6-32, PAN HEAD, BRASS	12	
280	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	36	Y
290	2H1260	• INSULATING BUSHING	24	
300	B-6641-265	• NUT, HEX, BRASS	24	Y
350	B-6637-30	• SCREW, PAN HEAD, CRES.	12	
360	3H1271-2	• CLIP, LEAD STRAP	6	
370	B-3837-N632	• WASHER, CORROSION RESISTANT	12	Y
380	B-6655-06	• NUT, HEX, SELF-LOCKING	12	Y
890	3H2050	• WIRE HARNESS	6	Y
900	B-3852-1-0	• • STRAP, TIEDOWN, PLASTIC	1	Y
910	B-3852-2-0	• • STRAP, TIEDOWN, PLASTIC	2	Y
975	101902	• • TERMINAL, RING	2	
975A	7931-320619	• • AMP 320619 PIDG RING TERMINAL ALTERNATE FOR ITEM 975	2	
975B	7931-2-320619-1	• • AMP 320619 PIDG RING TERMINAL ALTERNATE FOR ITEM 975	2	
	SAE-AMS-I-7444	• • CLEAR VINYL TUBING		
1130	4H3153	• MOUNTING PLATE, SPLIT	1	
1140	4H2422	• SLIP RING ASSEMBLY	1	
1141	102044-4-16	• SCREW, HEX HEAD, 1/4-28	AR	
1180	B-7077-52	• BELLEVILLE SPRING WASHER	12	Y
1190	B-3808-4	• NUT, HEX, SELF-LOCKING	12	
<b>NOTE 1</b>				
2010	3H2062-2	• MODULAR BRUSH BLOCK ASSEMBLY	2	
2015	1H1157	• SHIM,BRUSH BLOCK ASS'Y	2	
2515	B-6655-08	• NUT,HEX,SELF-LOCKING	4	Y
2520	B-3837-0463	• WASHER, CORROSION RESISTANT	12	Y
2525	B-6637-50	• SCREW, PAN HEAD, CRES.	4	
<b>NOTE 2</b>				
-	32370-11	• SWITCH, ILLUM, ROCKER (PIPER)	1	
-	B-3874-42A	• BOLT, 1/4-28, HEX HEAD	2	
-	3E1935	• SUPPORT ARM ASSEMBLY	2	
-	4E2032	• BRUSH BLOCK BRACKET	2	
<b>NOTE 1:</b> Refer to Kit 102600-2 in the Airframe section of this chapter for installation instruction for the brush block assembly.				
<b>NOTE 2:</b> Existing parts installed. Part number are supplied for replacement purposes only.				

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 102600-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**102600-(3,4)**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**102655-1**

**CE. Installation Instruction 11CE**

- (1) Mark the Indication Line on the wire harness (890) in accordance with Figure CE-1.
- (2) With spinner mounting bracket installed on the hub, use the bolts (1160), and washers (1200, 1210, and 1215) to attach the slip ring (1140) to the spinner mounting bracket as shown in Figure CE-2.
  - (a) Torque the bolts (1160) to 90-120 in. lbs. (10.8 -13.5 N•m).
  - (b) Perform the slip ring run-out check in accordance with the Check chapter of this manual.
- (3) Position the propeller blades at reverse blade angle.
- (4) Assemble the plug connection between the wire harness (890) and the de-ice boot.
- (5) Install the tie strap (920) around the wire harness/de-ice boot plug connection. Do not tighten at this time.
- (6) Secure the wire harness/de-ice boot connection to the clamp.
  - (a) Install tie straps (930) under the tie strap (920) connecting the wire harness/de-ice boot plugs, and around the clamp as shown in Figure CE-1.
  - (b) Position the tie strap head in the approximate location shown on the side of the clamp as shown in Figure CE-1. Do not tighten the tie strap (930) at this time.
- (7) Position the center of the wire harness/de-ice boot plug connection as shown in Figure CE-1.
- (8) Using a tie strap (920), secure the de-ice boot lead wire to the outboard tie strap (930) as shown in Figure CE-1. The tie strap (920) must cover the de-ice boot lead wire tubing. Do not tighten at this time.
- (9) Locate the Indication Line with the tie strap (930) as shown in Figure CE-1.
- (10) Using tie strap (920) secure the wire harness (890) to the inboard tie strap (930) as shown in Figure CE-1. Do not tighten at this time.
- (11) Position the wire harness/de-ice boot plug connection as shown in Figure CE-1. Make sure the tie strap is above the lubrication fitting.

This section includes the parts list(s) and installation instructions

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

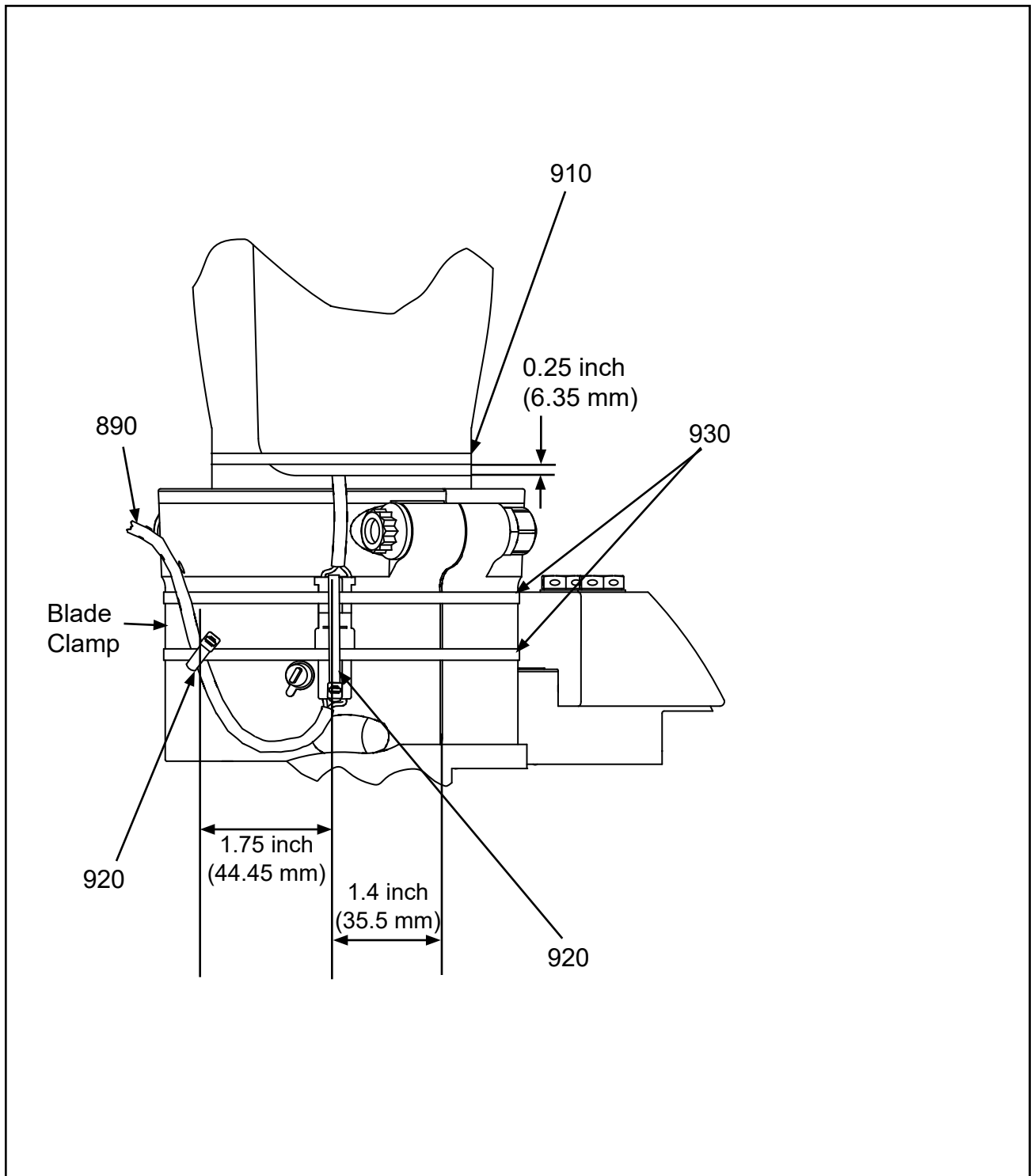
for the following electric de-ice kit(s):  
**102655-1**

CE. Installation Instruction 11CE - continued

- (12) Position one tie strap (910) around the bottom of the de-ice boot as shown in Figure CE-1.
- (13) Tighten all the tie straps (910, 920, and 930).
- (14) Using screws (220) and washers (200), attach the terminal strip (170) to the bulkhead in accordance with Figure CE-3.
- (15) Torque the screw (220) to 10-12 in. lb. (1.12-1.35 N•m).
- (16) Install the slip ring lead wires and de-ice wire harness (890) to the terminal strip (170) in accordance with Figure CE-3.
  - (a) Tighten the terminal screws until snug.
- (17) Install the clamp (590), around the wire harness (890) as shown in Figure CE-4.
- (18) Using screws (610), washers (610 and/or 630), nuts (600), and Figure CE-4, install the clamp (590) to the bulkhead.
  - (a) Torque the screw (610) to 22-25 in. lbs. (2.48-2.82 N•m).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**102655-1**

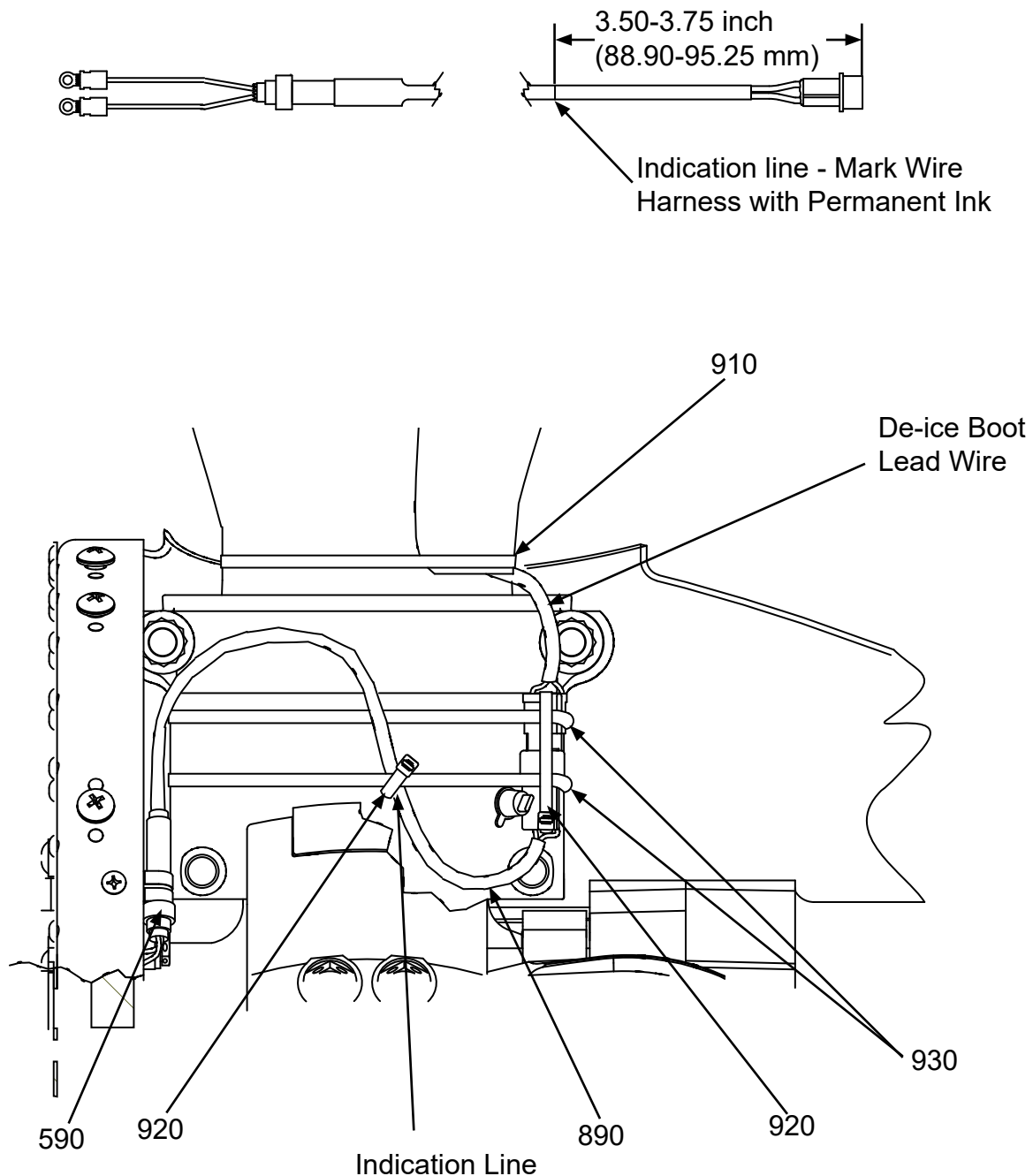


**Wire Harness and Tie Strap to Clamp  
Figure CE-1, page 1 of 2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**102655-1**

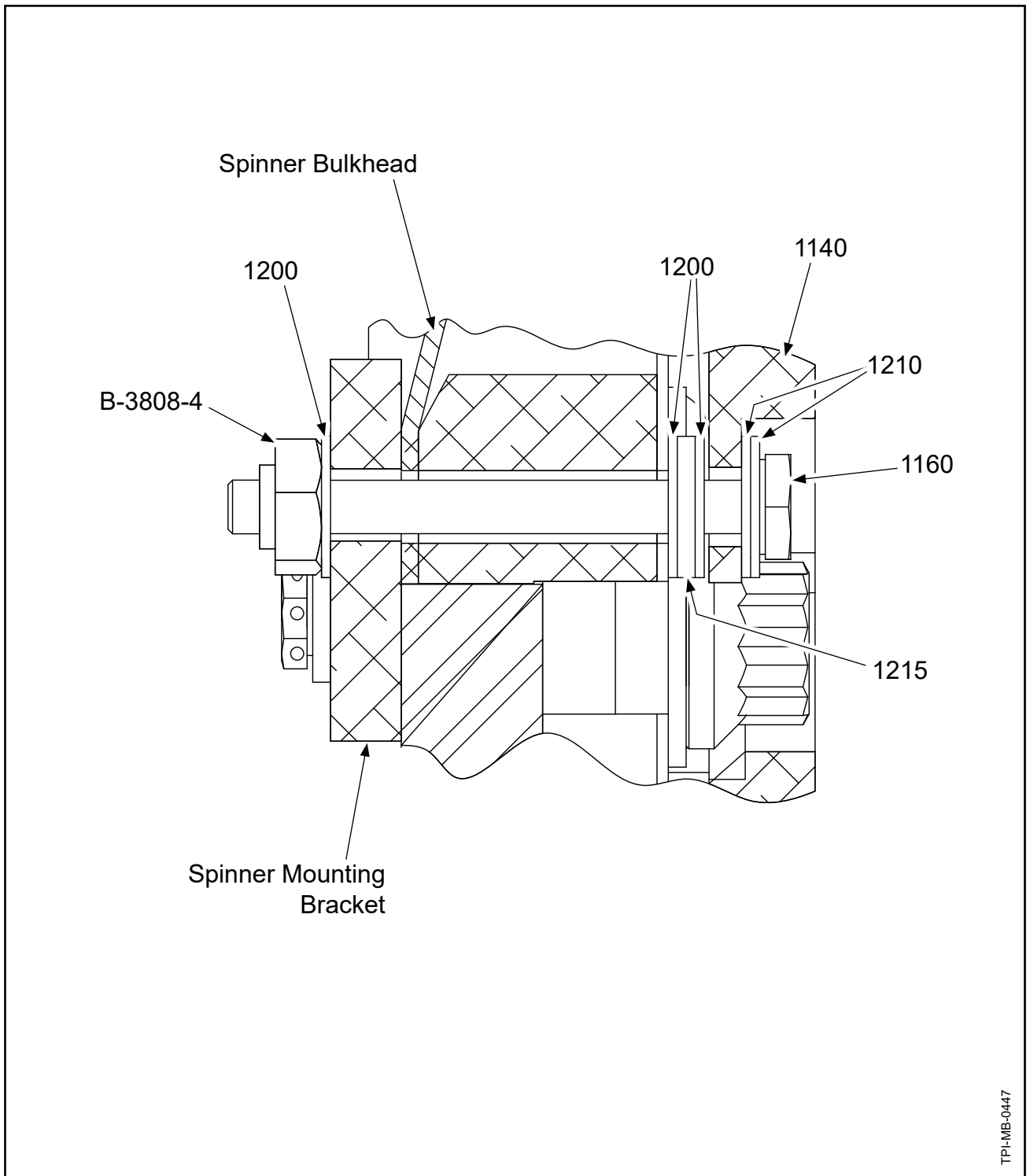


**Wire Harness and Tie Strap to Clamp**  
**Figure CE-1, page 2 of 2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**102655-1**

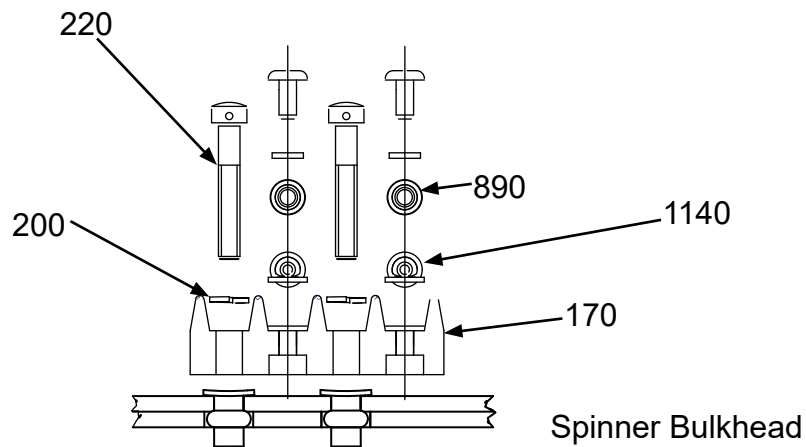
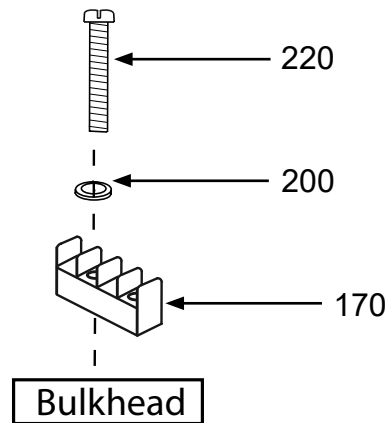


**Slip Ring Mounting  
Figure CE-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**102655-1**

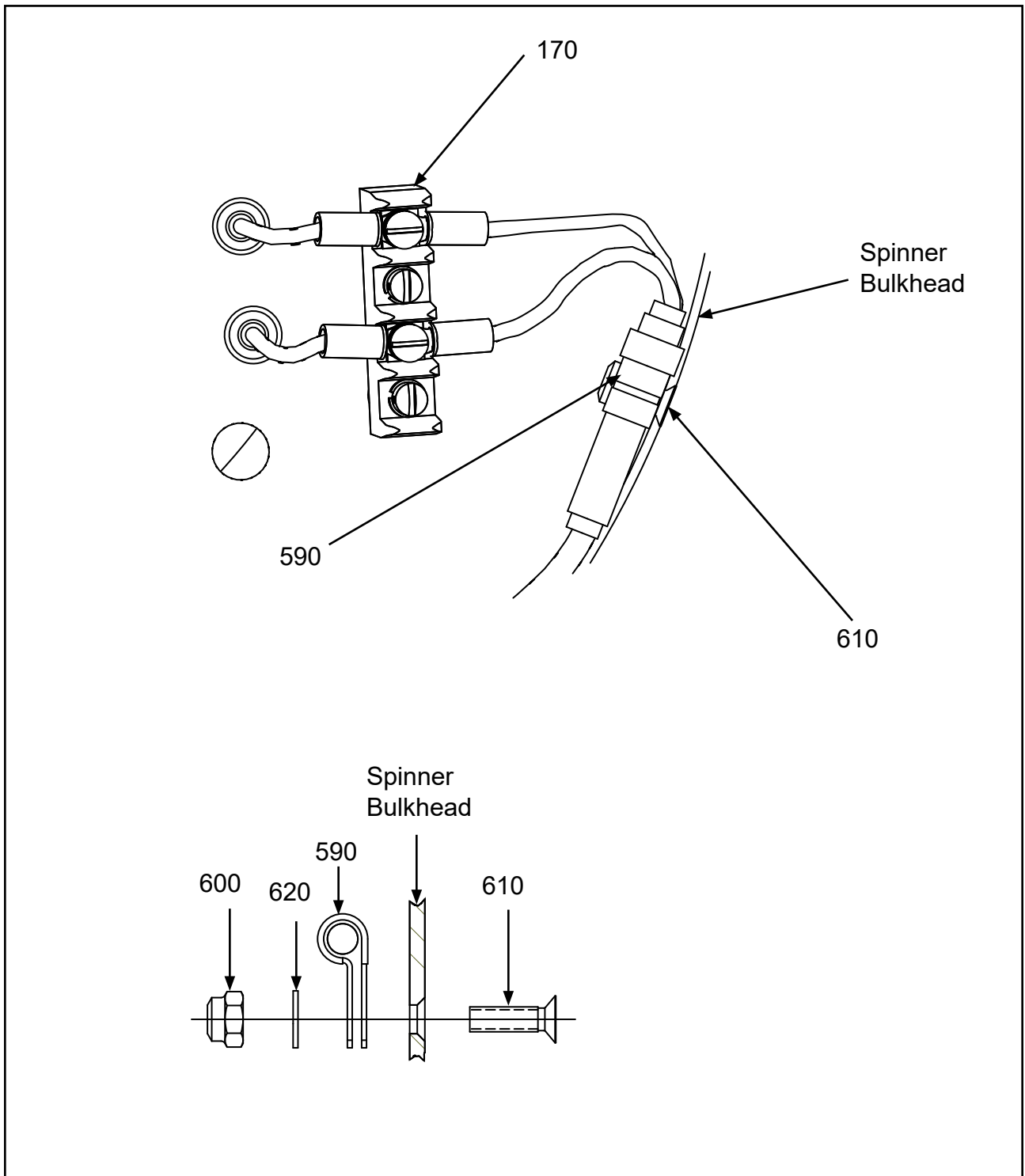


**Typical Two Wire Configuration**

**Terminal Strip  
Figure CE-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**102655-1**



**Loop Clamp to Bulkhead Orientation  
Figure CE-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**102655-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>102655-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11CE</b> <b>FIGURES: CE-1 thru CE-4</b>		
170	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM	3	
200	B-3854-41	• WASHER, LOCK	6	Y
220	B-6631-232	• SCREW, 6-32, FILLISTER HEAD, CRES	6	Y
590	B-6735	• CLAMP, LOOP, CUSHIONED	3	Y
600	B-6655-08	• NUT, HEX, SELF-LOCKING	3	Y
610	B-3866-50	• SCREW, 8-32, WASHER HEAD	3	Y
620	B-3837-N832	• WASHER, CORROSION RESISTANT	3	Y
890	3H2507-1	• WIRE HARNESS	3	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	3	Y
920	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	6	Y
930	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	6	Y
1140	4H2714-1	• SLIP RING ASSEMBLY	1	
1160	B-3384-23	• BOLT, 1/4-28, HEX HEAD	6	Y
1200	B-3837-0432	• WASHER, CORROSION RESISTANT	18	Y
1210	B-3837-0463	• WASHER, CORROSION RESISTANT	12	Y
1215	B-3855-33	• WASHER, EXTERNAL, LOCK	6	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 102655-1**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the installation instructions and parts list(s)  
for the following electric de-ice kit(s):  
**102960-1**

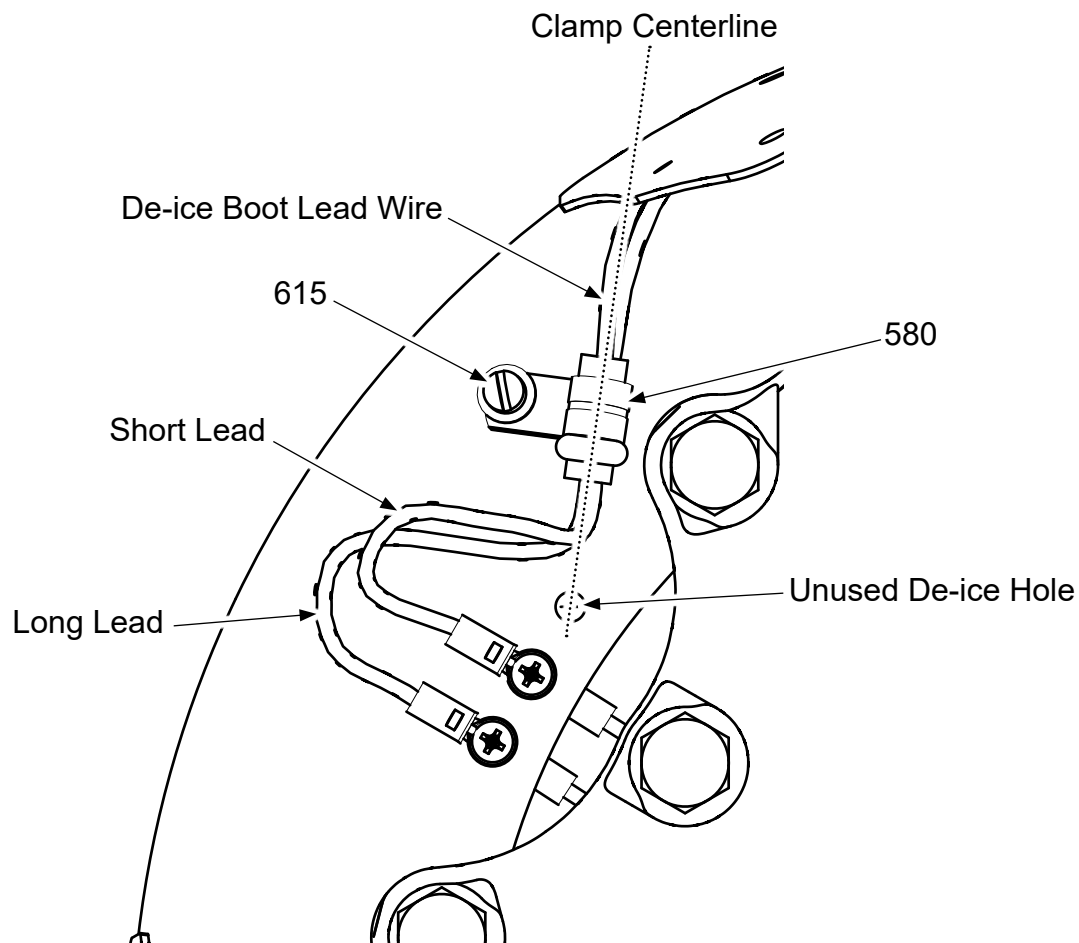
**CF. Installation Instruction 11CF**

- (1) Make sure the de-ice boot lead wires lay flat against the bulkhead.
  - (a) Twisting of the lead wires is not permitted. Refer to Figure CF-1.
- (2) Install the clamp (580) around the de-ice boot lead wire in accordance with Figure CF-1.
  - (a) Align the centerline of the clamp (580) with the unused de-ice hole in the spinner bulkhead as shown in Figure CF-1.
  - (b) Using the screw (615), washer (620), washer (630), and nut (600) attach the clamp (580) to the spinner bulkhead in accordance with Figure CF-2.
  - (c) Torque the screw (615) to 22-25-in.lbs. (2.48-2.82 N•m).
- (3) Using the screw (270), lock washers (280), bushings (290), and nuts (300 and 310), attach the de-ice boot lead wire and the slip ring wire harness (890) to the bulkhead in accordance with Figure CF-1 and Figure CF-3.
  - (a) Torque the nut (300) to 6-8 in.lbs. (0.68 - 0.90 N•m).
  - (b) Torque the nut (310) to 10-12 in.lbs. (1.13-1.35 N•m).
- (4) Using the hardware supplied with the slip ring starter ring gear, install the terminal ends of the slip ring wire harnesses (890) to the terminal studs of the slip ring starter ring gear in accordance with Figure CF-4.
- (5) Using the tie straps (1820), secure the slip ring wire harness (890) to the hub.
  - (a) Center the tie straps (1820) on the hub length as shown in Figure CF-4.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the installation instructions and parts list(s)  
for the following electric de-ice kit(s):

**102960-1**

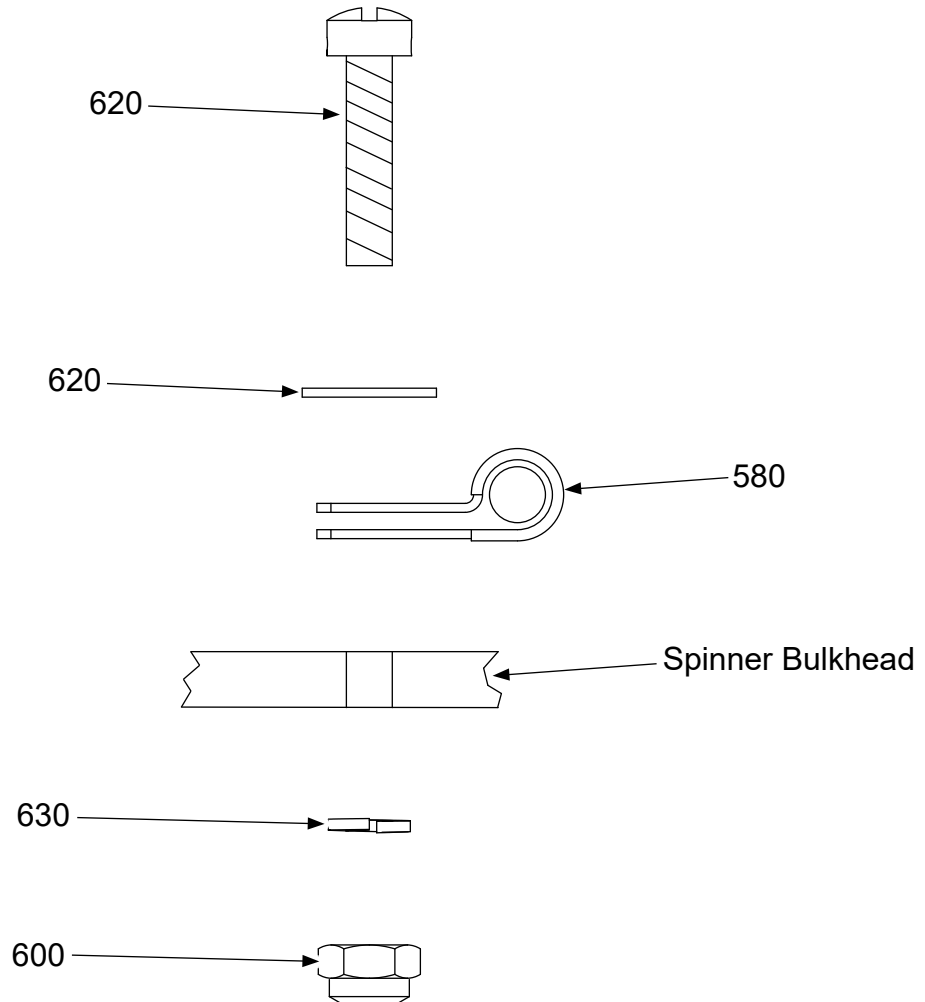


TL-1800141

**Attaching the Clamp/De-ice Boot Lead Wires to Bulkhead  
Figure CF-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the installation instructions and parts list(s)  
for the following electric de-ice kit(s):  
**102960-1**



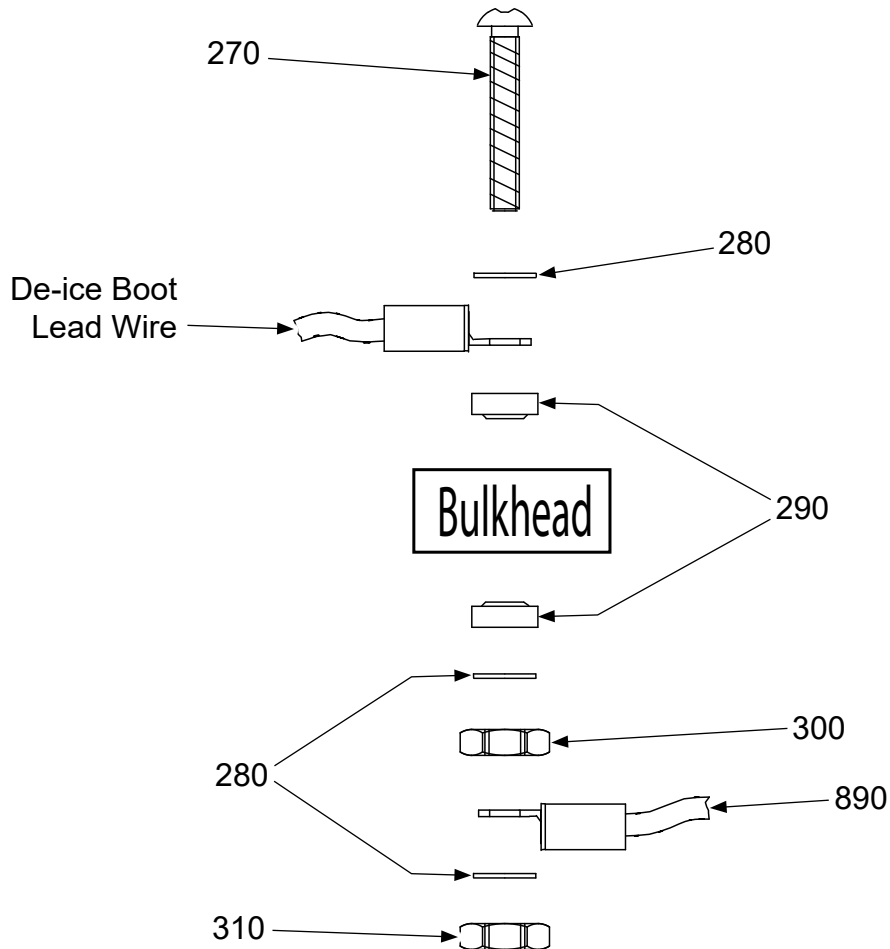
TI-180201

**Clamp Hardware Configuration  
Figure CF-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the installation instructions and parts list(s)  
for the following electric de-ice kit(s):

**102960-1**



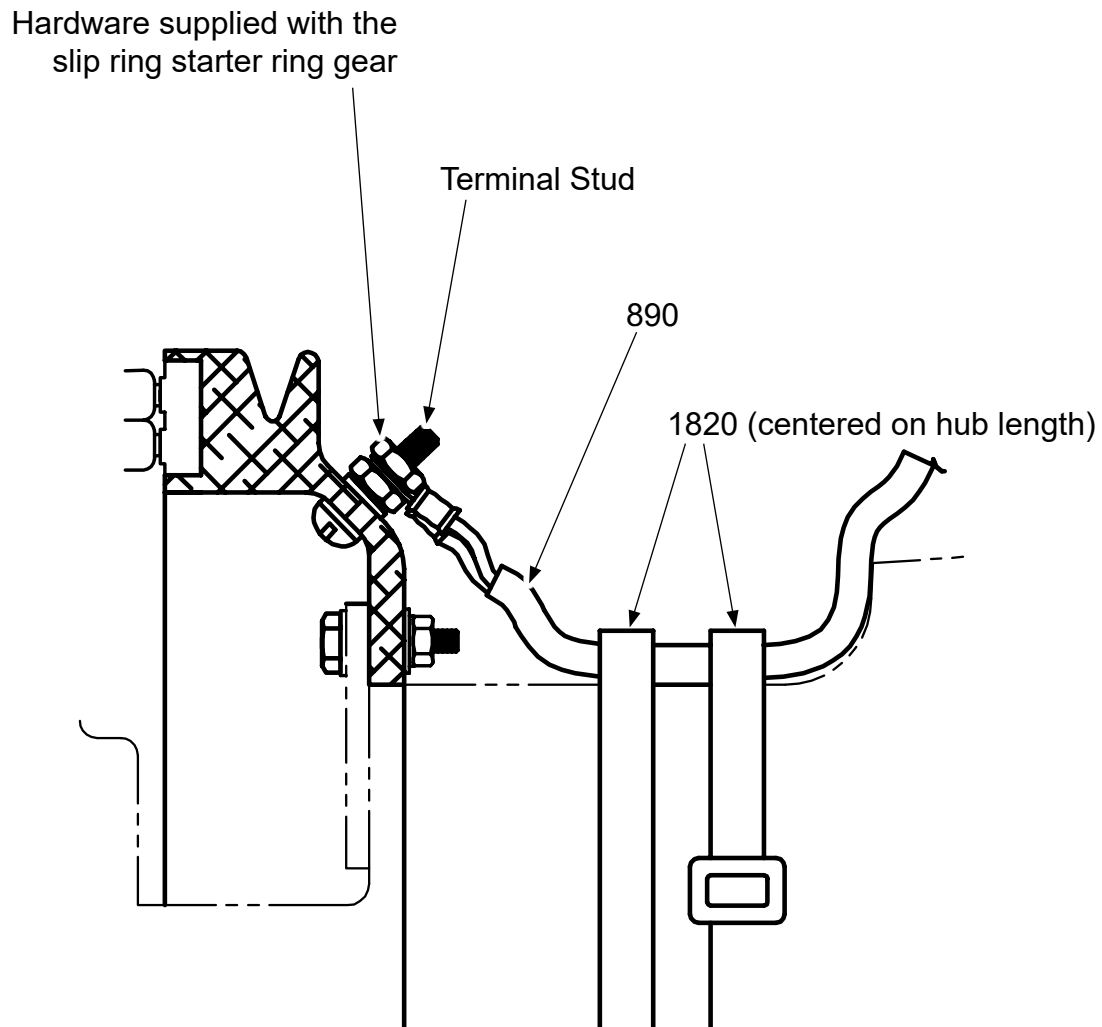
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**Attaching De-ice Wires to Bulkhead  
Figure CF-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the installation instructions and parts list(s)  
for the following electric de-ice kit(s):

**102960-1**



**NOTE:** If the slip ring starter ring gear has only two sets of terminals studs, connect two of the three slip ring wire harnesses (890) to a single set of terminal studs on the slip ring starter ring gear.

TI-18000134

**Slip Ring Wire Harness Connection  
Figure CF-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the installation instructions and parts list(s)  
for the following electric de-ice kit(s):  
**102960-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>102960-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11CF</b> <b>FIGURES: CF-1 thru CF-4</b>		
270	B-7035-14	• SCREW, 6-32, PAN HEAD, BRASS	6	
280	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	18	
290	2H1260	• INSULATING BUSHING	12	
300	B-6641-265	• NUT, HEX, BRASS	6	
310	102856-C06	• NUT, SELF-LOCKING, THIN	6	
580	B-6735-1	• CLAMP, LOOP, CUSHIONED	3	Y
600	B-6605-08	• NUT, SELF-LOCKING	3	
615	B-3856-246	• SCREW, 8-32, FILLISTER HEAD	3	Y
620	B-3837-N832	• WASHER, CORROSION RESSISTANT	3	Y
630	B-3854-42	• WASHER, LOCK	3	Y
890	3H3158-2	• WIRE HARNESS, SLIP RING	3	Y
1820	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	2	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 102960-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**103605**

**CG. Installation Instruction 11CG**

- (1) Install the bracket (1300) and washers (1305) on the hub clamping bolt (1315) between the hub and the nut in accordance with Figure CG-1.
  - (a) Position bracket parallel to the blade as shown in Figure CG-2.
  - (b) Torque the nut to 22-25 Ft-Lb (29-33 N•m).
- (2) Using the screws (1170), attach the slip ring (1140) and the bulkhead to the hub as shown in Figure CG-3.
  - (a) Torque each screw (1170) 96-120 In-Lb (10.1-13.5 N•m).
  - (b) Perform slip ring run-out check in accordance with the Check chapter of this manual.
- (3) Position the propeller blades at reverse blade angle.
- (4) If required, press the spring pin (905) perpendicularly into the hole in the counterweight as shown in Figure CG-4.
  - (a) The spring pin (905) must extend to a height of 0.170 - 0.210 inch (4.32 - 5.33 mm).

**NOTE:** The counterweight may have been drilled for the spring pin or may have an integral (cast) pin in place of the spring pin.

- (5) Assemble the plug connection between the wire harness (890) and the de-ice boot.
- (6) Install the wire harness/de-ice boot plug connections in the groove in the counterweight against the spring pin (905) as shown in Figure CG-5.
- (7) Install the tie strap (910) in the retaining grooves of the counterweight and around the counterweight and between the wires of the wire harness/de-ice boot plug connection.
- (8) Position the tie strap head (910) in the approximate location shown in Figure CG-5.
- (9) Using the tie strap (930), secure the de-ice boot lead wires to the tie strap (910) as shown in Figure CG-5.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**103605**

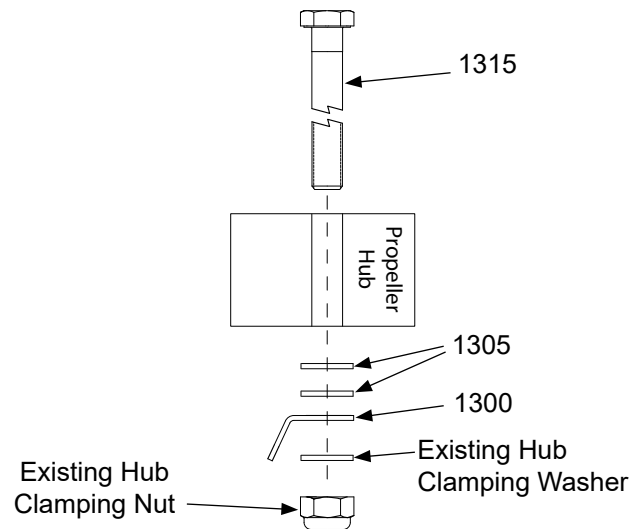
**CG. Installation Instruction 11CG - continued**

- (10) Install the clamp (660) around the wire harness (890) as shown in Figure CG-6.
- (11) Apply threadlocker CM399 to the threads of the screw (650).
- (12) Using screw (650) and washers (630), install the clamp (660) to the counterweight in accordance with Figure CG-6.
- (13) Torque the screw (650) to 20-22 In-Lb (2.3-2.4 N•m).
- (14) Position the de-ice boot lead wire on the bracket (1300) with the O-ring as shown in Figure CG-2. Install the tie straps (840). Twisting of the lead wires is not permitted.
- (15) Using the screw (220), washer (200), and tapped eyelet (190), attach the terminal strip (170) to the bulkhead in accordance with Orientation B shown in Figure CG-7.
- (16) Torque the screw (220) to 10-12 In-Lbs (1.1-1.3 N•m).
- (17) Install the slip ring lead wires and de-ice wire harness (890) to the terminal strip (170) in accordance with Figure CG-7 and Figure CG-8.
- (18) Tighten the terminal screws until snug.



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

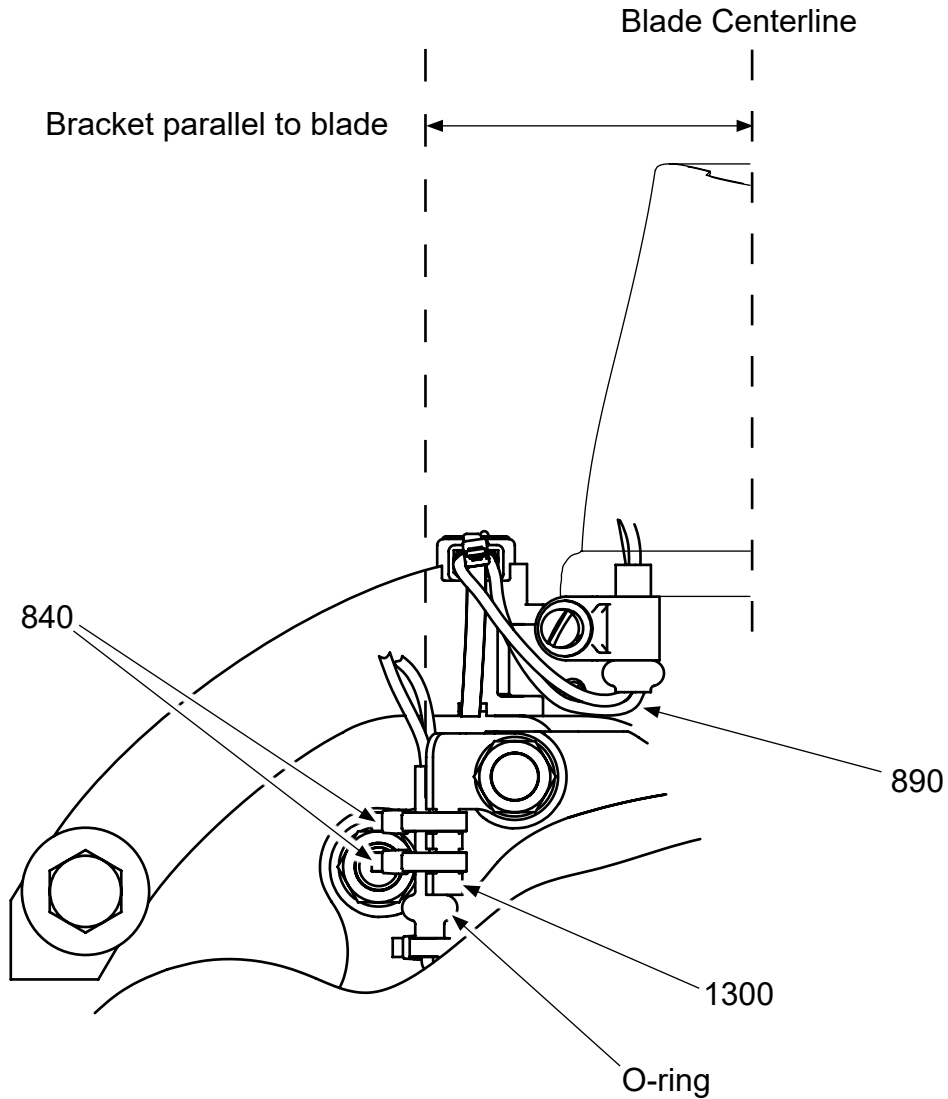
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103605**



**Wire Harness Bracket Hardware  
Figure CG-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103605**



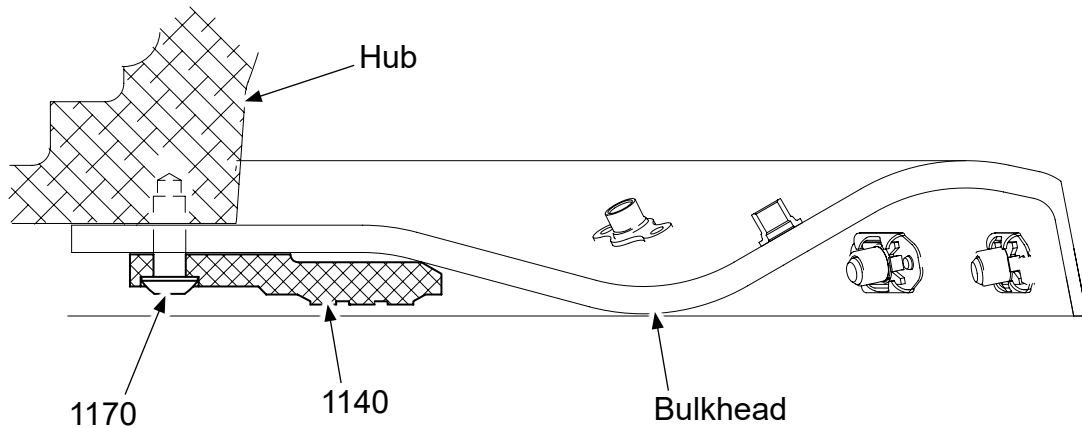
TI-1800807

**Wire Harness Bracket Alignment  
Figure CG-2**

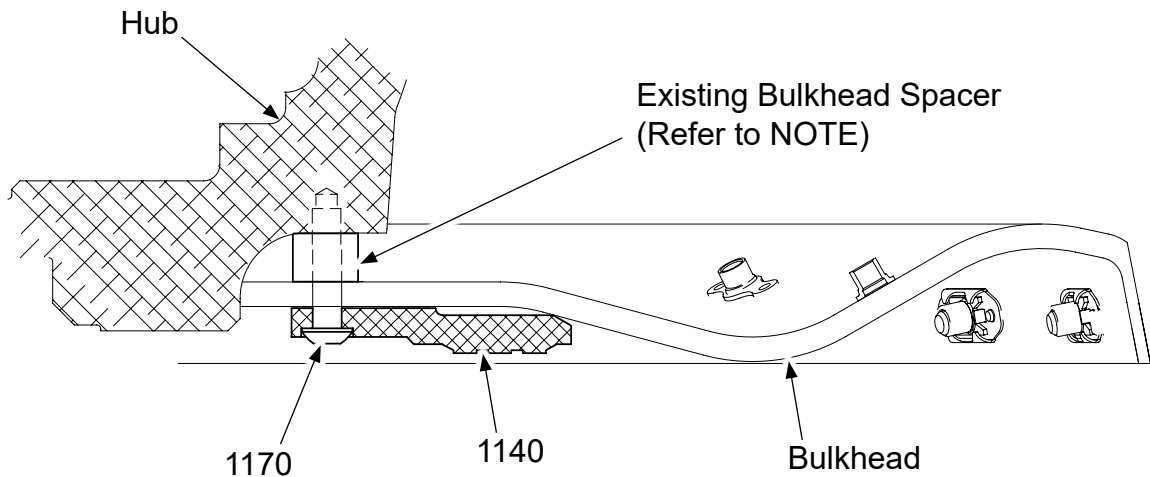
**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103605**

**Typical Slip Ring Installation (without bulkhead spacer)**



**Typical Slip Ring Installation (with bulkhead spacer)**



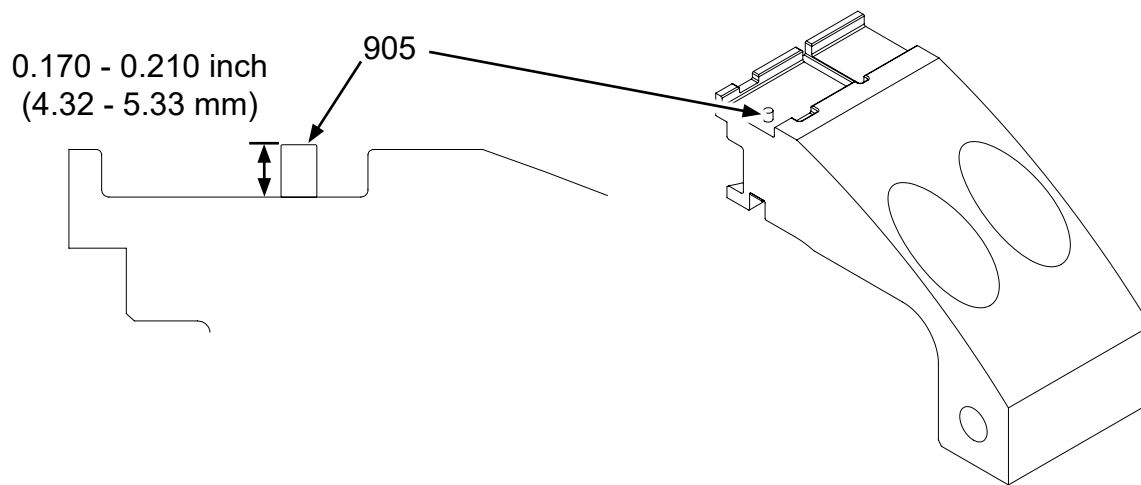
**NOTE:** The bulkhead spacer is a spinner mounting component and is application specific. Refer to Hartzell Propeller Application Guide Manual 159 (61-02-59).

TPI-MB-0204, TPI-MB-0223

**Slip Ring Mounting  
Figure CG-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103605**



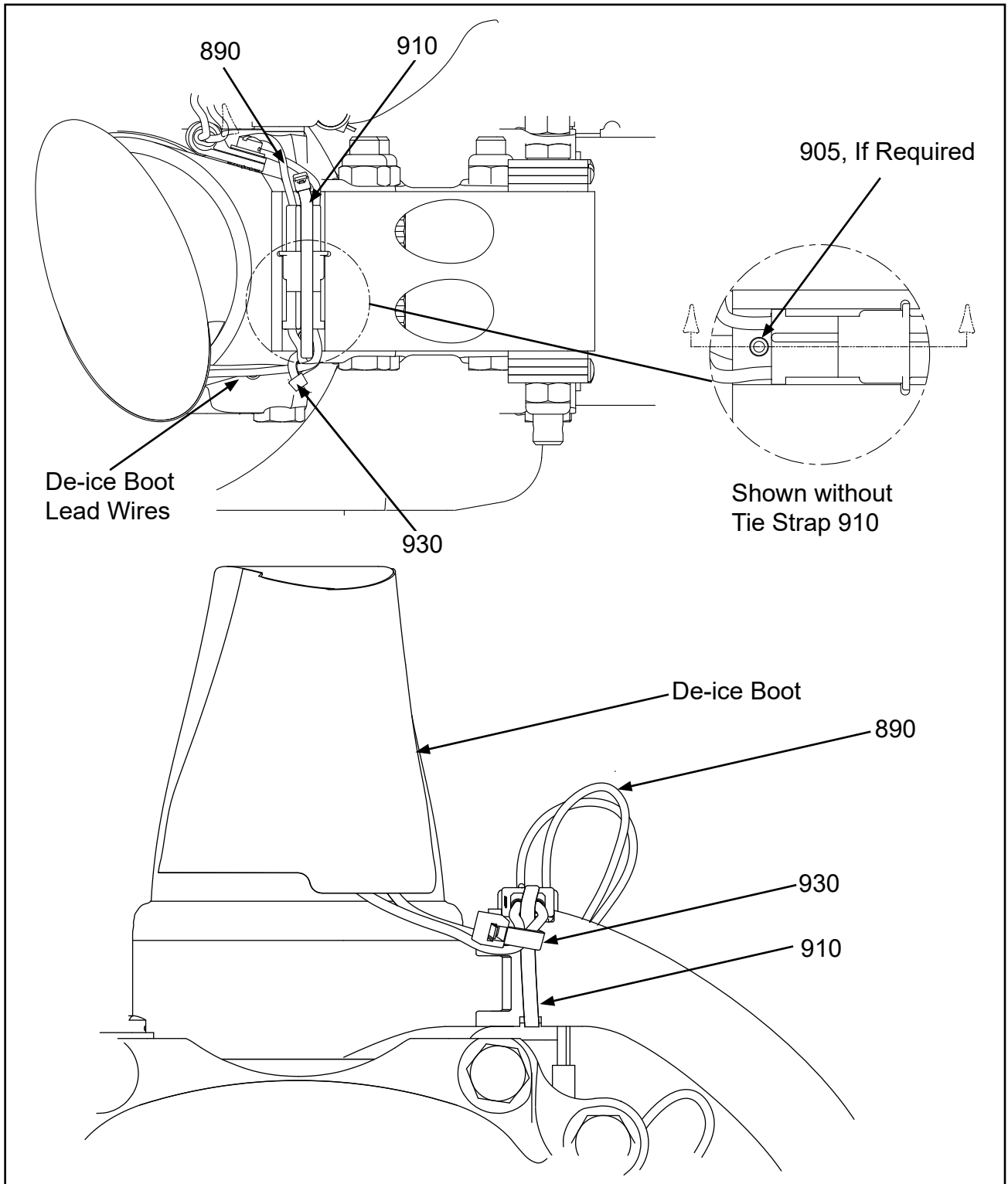
TPI-MB-0078

**Spring Pin Height  
Figure CG-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

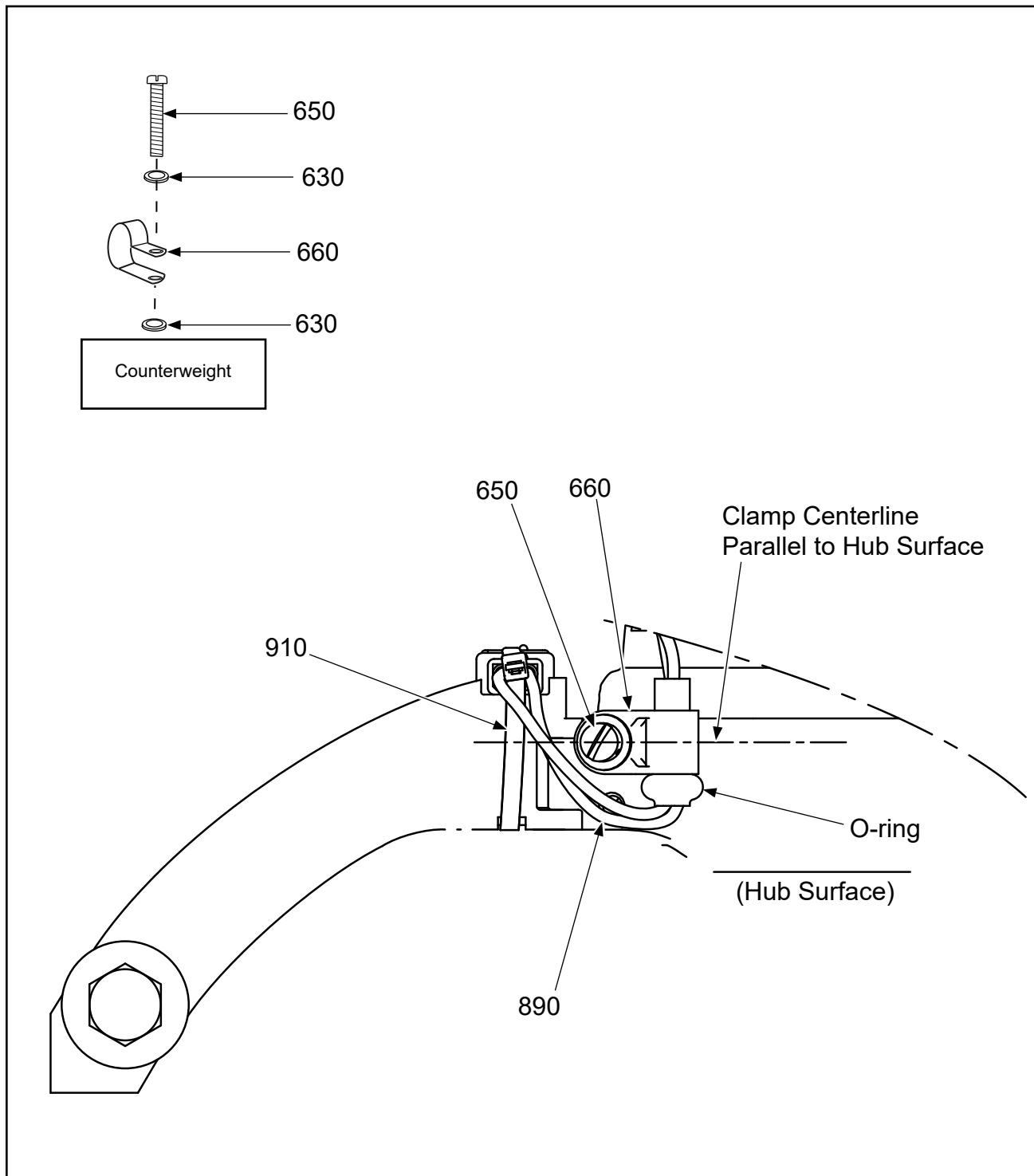
**103605**



**Wire Harness to Blade Shank/Counterweight  
Figure CG-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

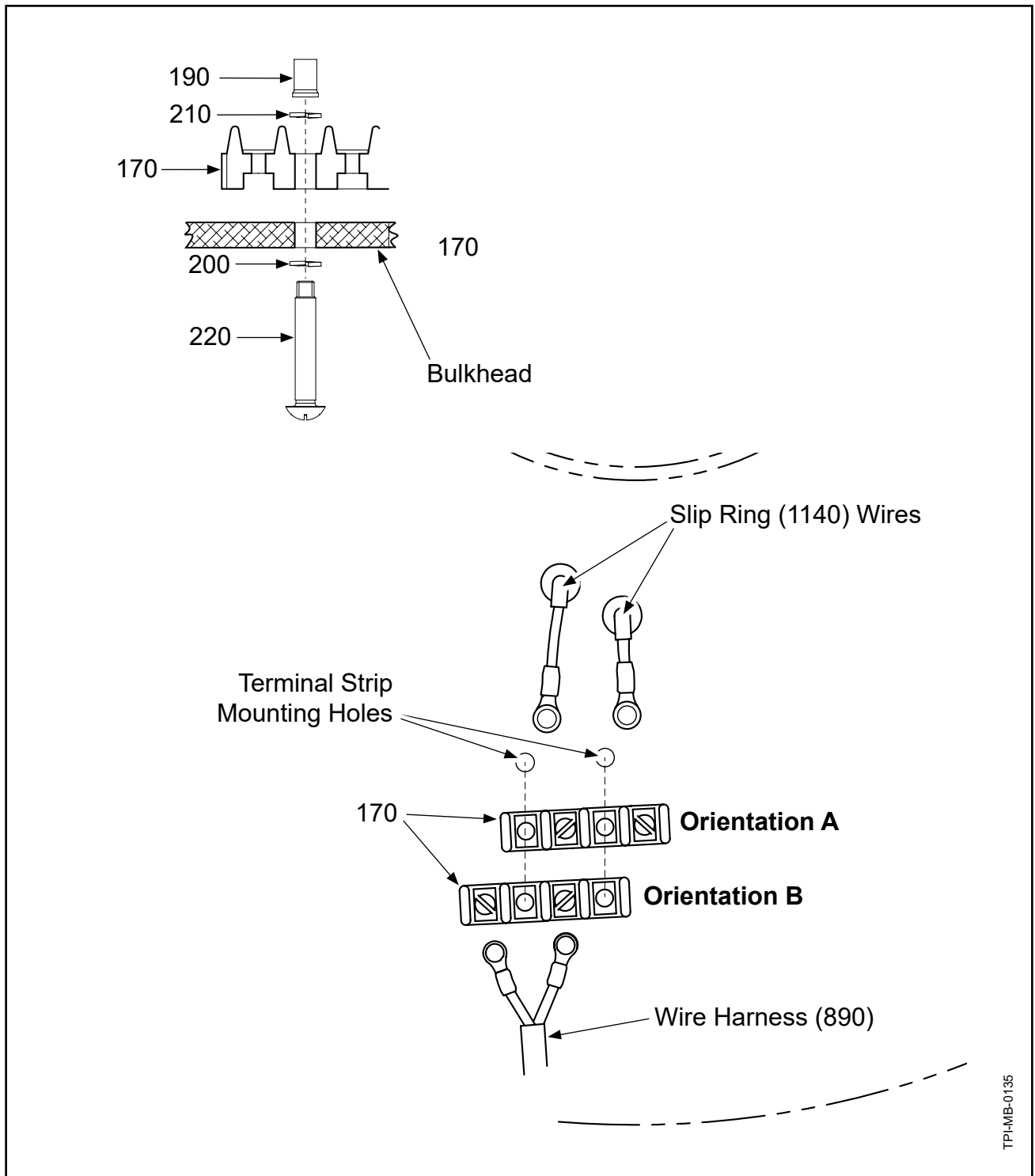
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103605**



**Loop Clamp Orientation  
Figure CG-6**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103605**

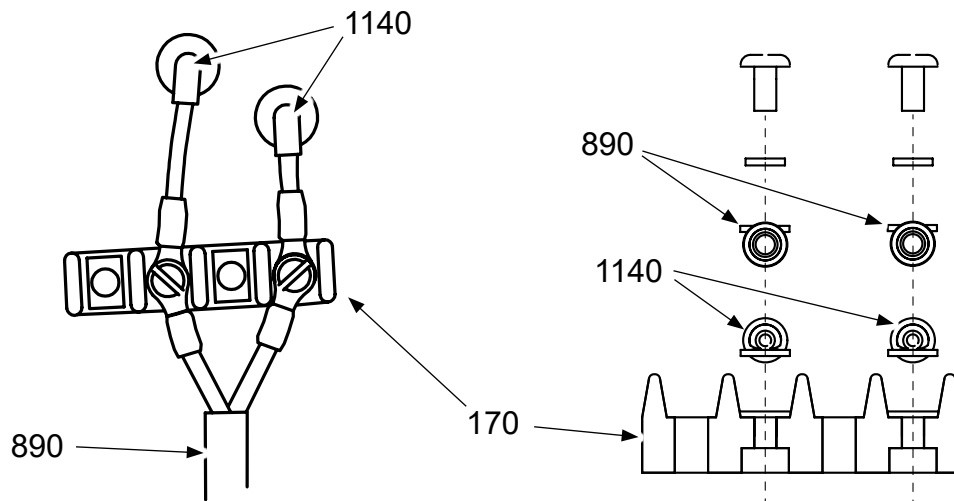


**Terminal Strip Mounting  
Figure CG-7**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103605**

**Typical Two-wire Configuration**



**NOTE:** The illustrations show slip ring wires on a typical right-hand (rotation) propeller.

**Terminal Strip Lead Wire Connection  
Figure CG-8**



# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103605**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>103605</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11CG</b> <b>FIGURES: CG-1 thru CG-8</b>		
170	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM	4	
190	2H1365	• TAPPED EYELET	8	Y
200	B-3854-41	• WASHER, LOCK	16	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	8	Y
630	B-3837-0332	• WASHER, CORROSION RESISTANT	8	Y
645	B-3855-32	• DELETED	-	
650	B-3840-7	• SCREW, 10-32, FILLISTER HEAD, CRES	4	Y
660	B-3853-F5	• CLAMP, LOOP, PLASTIC	4	Y
840	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	8	Y
890	103600	• DE-ICE WIRE HARNESS	4	Y
905	B-6378-0500	• SPRING PIN, 1/8" REPLACED BY ITEM 905A	AR	Y
905A	B-6378-7	• SPRING PIN, 1/8", CRES REPLACES ITEM 905, REFER TO NOTE 1	AR	Y
905B	B-3842-0437	• SPRING PIN, 3/32", CRES, REFER TO NOTE 1	AR	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	4	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	4	Y
1140	4H2674-2	• SLIP RING ASSEMBLY	1	
1170	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	8	Y
1300	B-6265	• BRACKET, WIRE HARNESS	4	
1305	B-3834-0663	• WASHER	8	Y
1315	102691	• BOLT, 3/8-24, HEX HEAD	4	
<p><u>NOTE 1:</u> COUNTERWEIGHTS WERE ORIGINALLY MANUFACTURED USING 1/8" SPRING PINS. COUNTERWEIGHTS ARE NOW MANUFACTURED USING 3/32" SPRING PINS. REFER TO HARTZELL PROPELLER MANUAL 135F (61-13-35) FOR COUNTERWEIGHT INSPECTION/REPAIR INFORMATION.</p>				

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 103605**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103605**

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This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103719**

**CH. Installation Instruction 11CH**

- (1) Install the existing hub clamping nut, existing hub clamping washer, and bracket (1300) to the existing hub clamping bolt as shown in Figure CH-1.
- (2) Torque the nut to 22-25 ft. lb. (29-33 N•m).
- (3) Position the propeller blades at low blade angle or start lock angle.
- (4) Route the terminal end of the wire harness (890) through the hole in counterweight, as shown in Figure CH-2.
- (5) Assemble the plug connection between the wire harness (890) and the de-ice boot.
- (6) Install and tighten the tie strap (900) around the wire harness/de-ice boot plug connection.
- (7) Position the tie strap head (900) in the approximate location shown in Figure CH-2. Do not tighten at this time.
- (8) Secure the wire harness/boot connection to the counterweight.
  - (a) Install the tie strap (910) under the tie strap (900), connecting the wire harness/boot plugs, around the counterweight, and under the wire harness (890) as shown in Figure CH-2.
  - (b) Position the tie strap head in the approximate location shown on the side of the counterweight, as shown in Figure CH-2.
  - (c) Do not tighten the tie strap (910) at this time.
  - (d) Tighten all of the tie straps (900 and 910).
- (9) Install the clear vinyl tubing over the wire harness (890).
- (10) Install the AMP terminals (975) on the lead wires in accordance with the manufacturer's instructions.
  - (a) Verify that the AMP terminals (975) are secure.
- (11) Make sure that the clear tubing is between the plug connectors and the tie strap (1330). Install the tie strap (1330) at the index mark on the wire harness (890). Twisting of wires is not permitted. Refer to Figure CH-1.
- (12) Position the clear tubing against the tie strap (1330) and position the tie strap (1330) against the de-ice bracket (1300) as shown in Figure CH-1.
- (13) Using two tie straps (1330), secure the area of the de-ice wire harness with the clear tubing installed to the de-ice bracket (1300).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

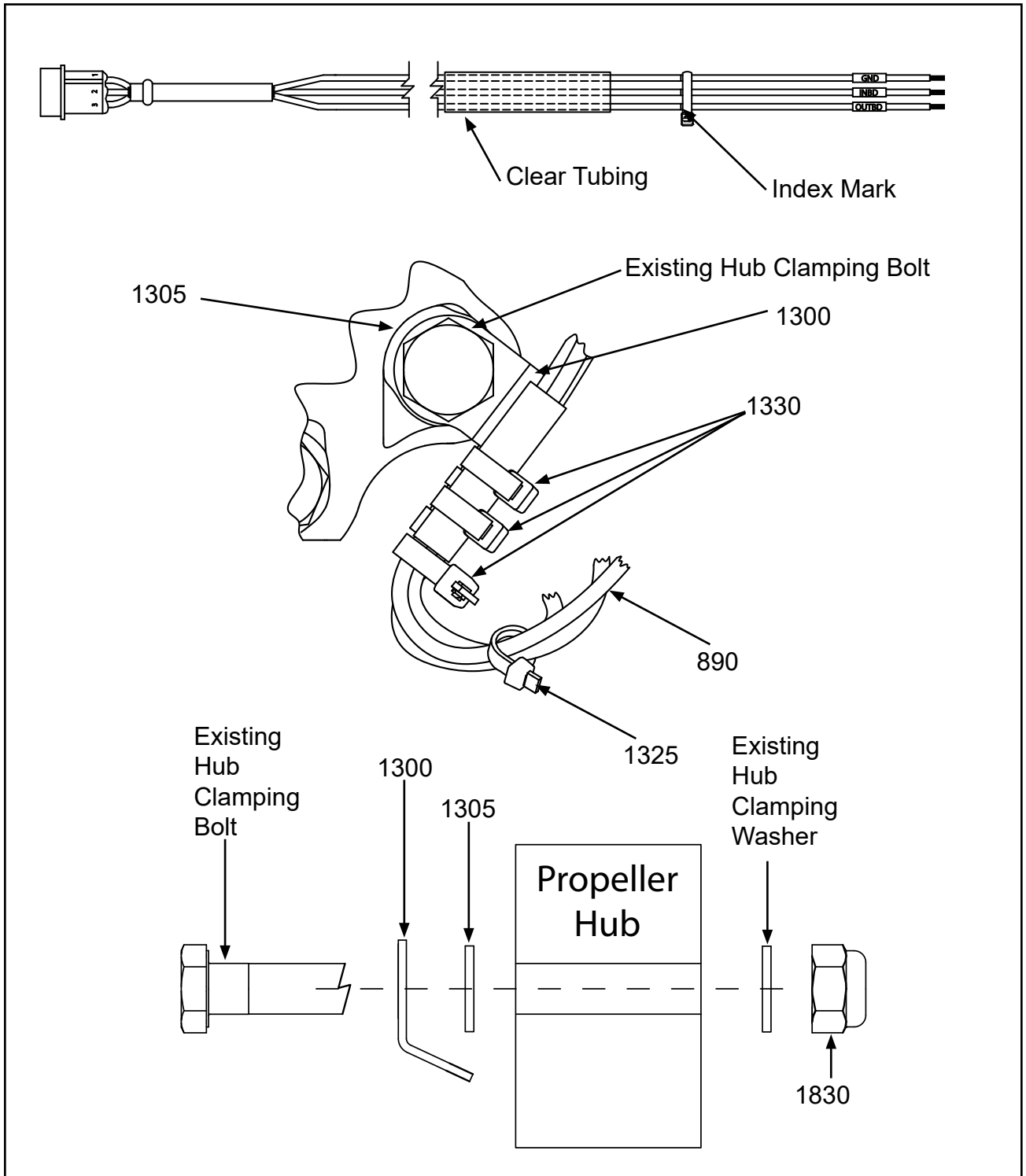
**103719**

CH. Installation Instruction 11CH - continued

- (14) Using screw (270), washer (280), insulating bushings (290), and nut (300 and/or 305), connect the de-ice wire harness (890) and the slip ring wire harness (895) to the bulkhead in accordance with Figure CH-3 and Figure CH-4.
  - (a) Torque the nut (300) to 6-8 in. lbs. (0.6-0.9 N•m) and nut (305) to 10-12 in. lbs. (1.1-1.3 N•m).
- (15) Install the tie strap (1325) around wire harness (890) as shown in Figure CH-2, Figure CH-4, and Figure CH-5.
- (16) Using the hardware supplied with the starter ring gear, attach slip ring wire harness (895) to starter ring gear as shown in Figure CH-6. Torque the nuts to 6-8 in. lbs. (0.6-0.6 N•m).
- (17) Using two tie straps (1820), secure the slip ring wire harness (895) to the hub as shown in Figure CH-5.
- (18) Cycle the propeller from low angle to high angle to verify proper wire harness installation. Make sure wire harness is not obstructed during cycling.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

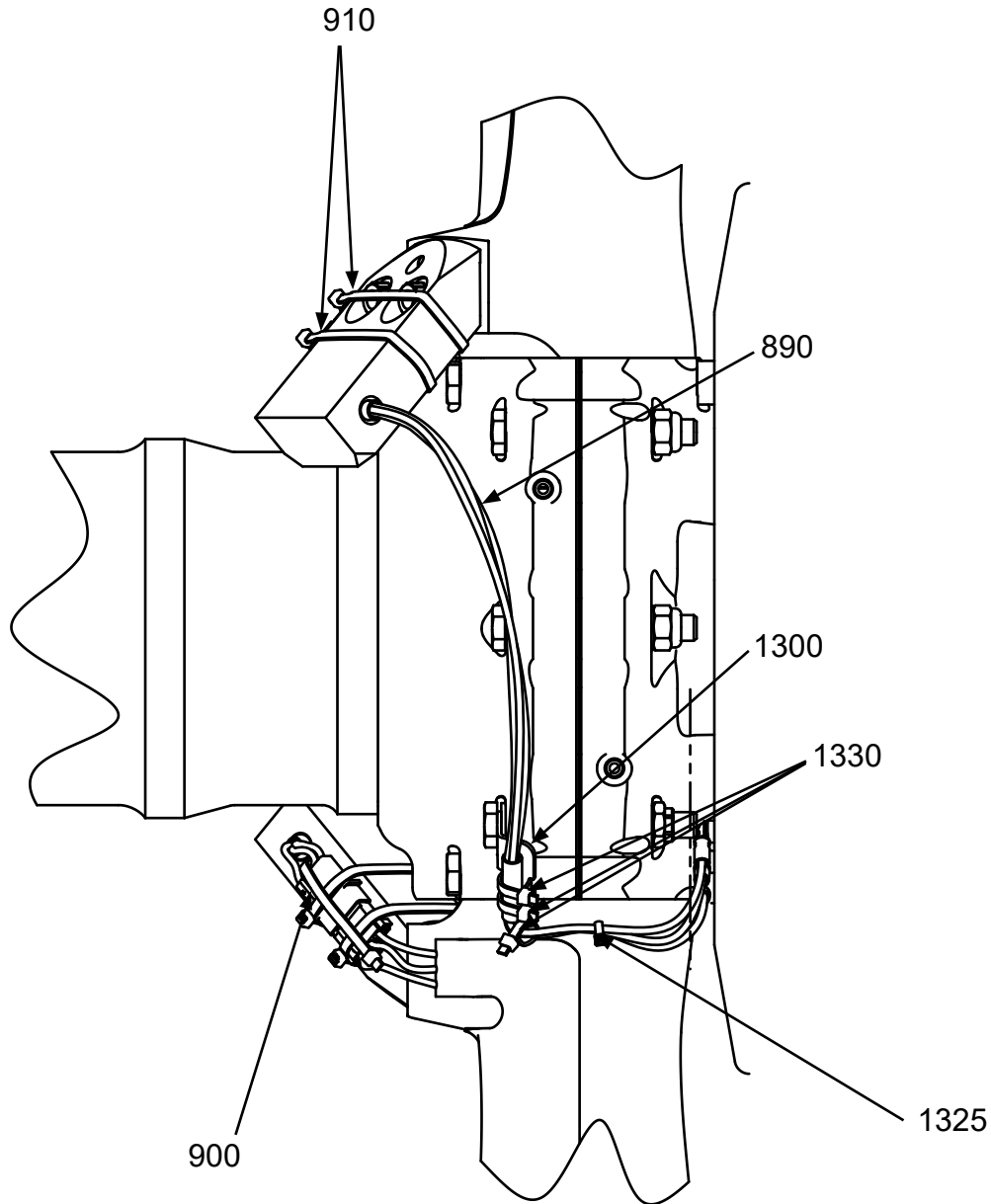
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103719**



**Bracket to Hub Attachment  
Figure CH-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

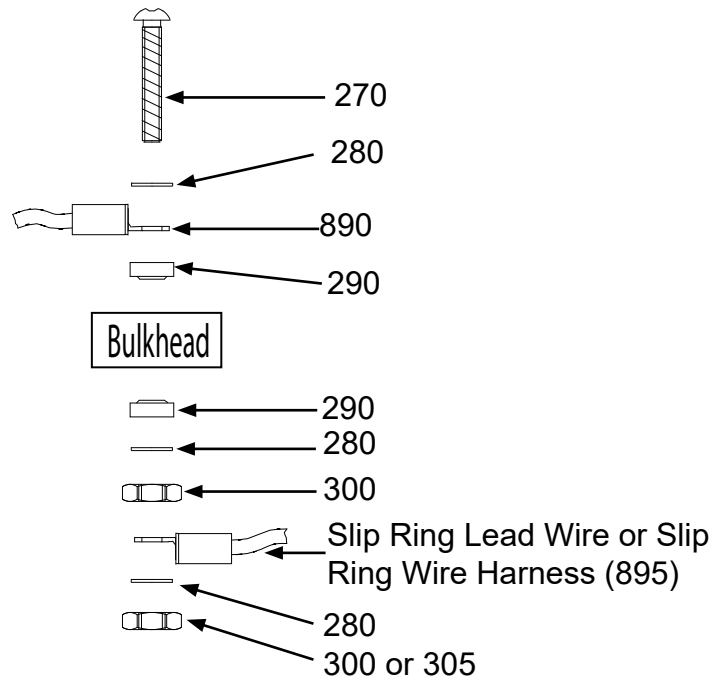
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103719**



**Wire Harness to Counterweight Attachment  
Figure CH-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

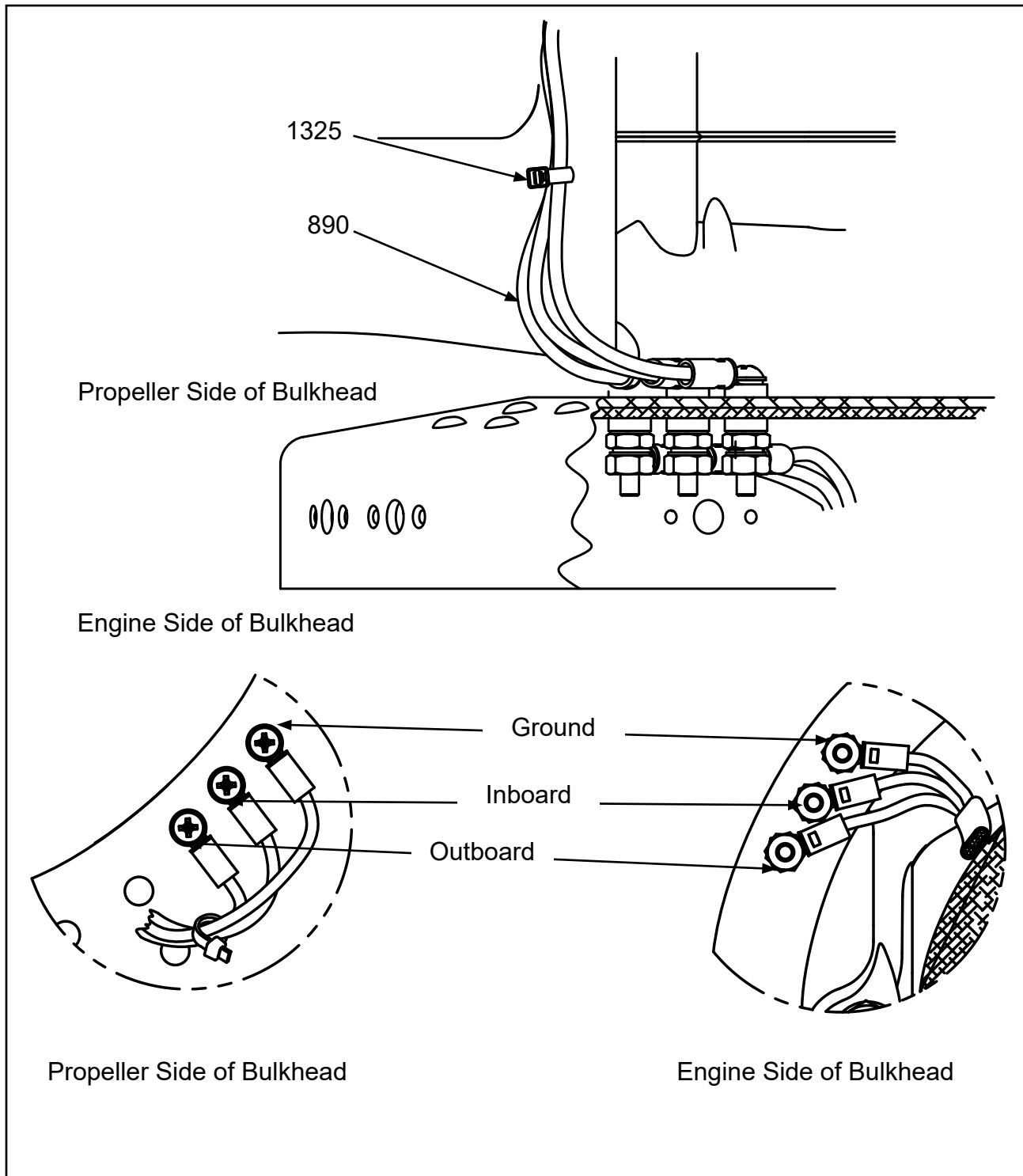
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103719**



**Securing De-ice Wire Harness and Slip Ring Lead Wire to Bulkhead  
Figure CH-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103719**

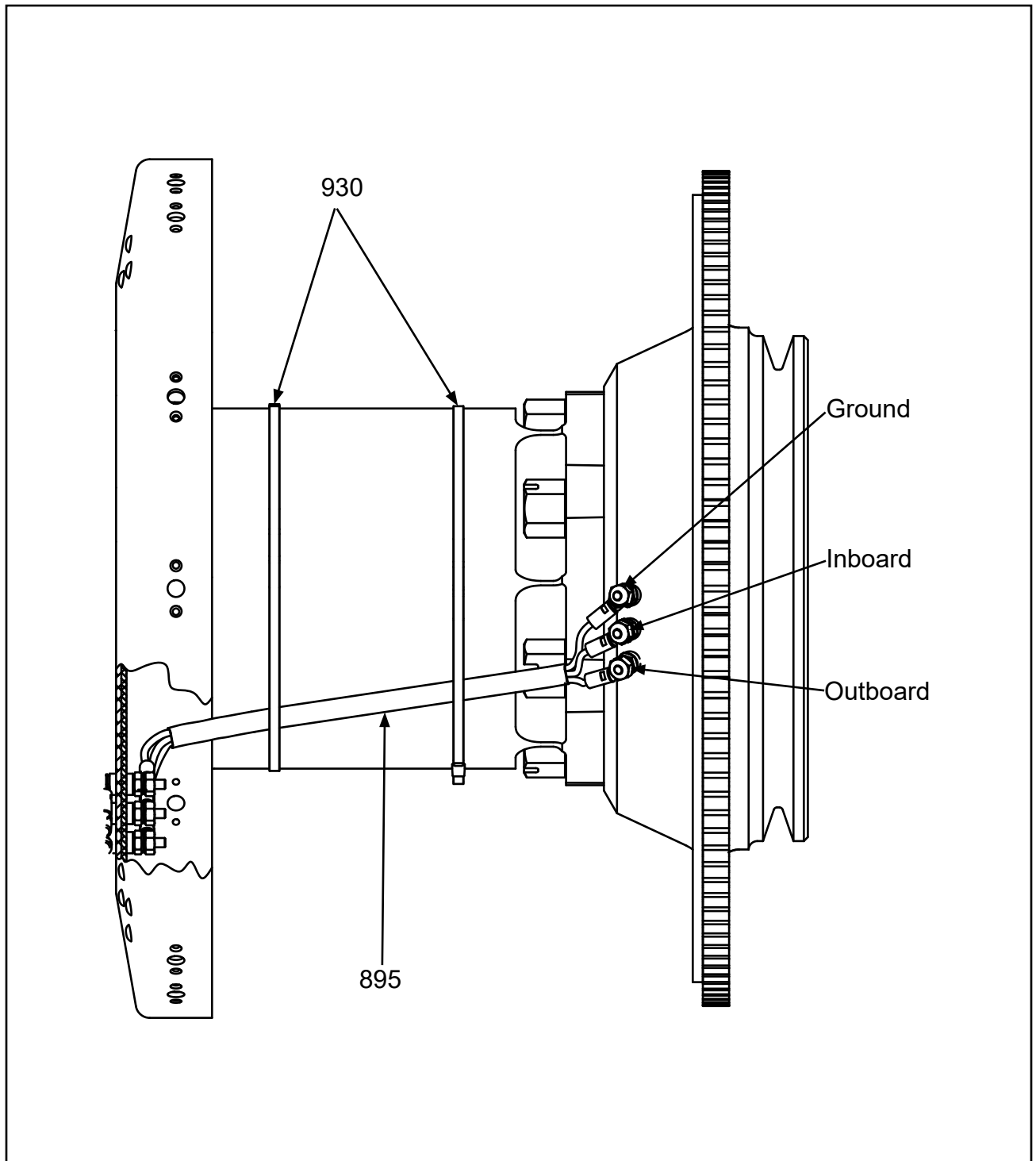


**De-ice Wire Harness Routing  
Figure CH-4**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103719**



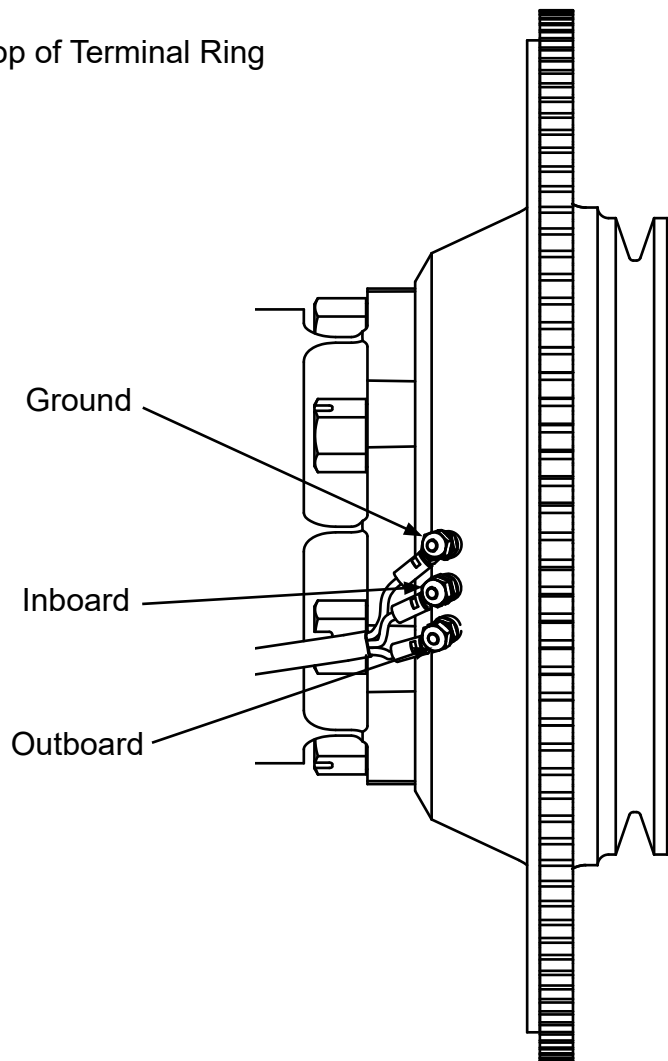
**Tie Straps Holding Slip Ring Wire Harness to Hub  
Figure CH-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103719**

**Attaching Hardware Supplied with Starter Ring Gear**

Install Starlock Washer on Top of Terminal Ring



**Attaching Wire Harness to Starter Ring Gear  
Figure CH-6**

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**103719**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>103719</b>	<b>PROPELLER DE-ICE KIT INSTALLATION INSTRUCTION 11CH FIGURES: CH-1 thru CH-6</b>		
270	B-7035-14	• SCREW, 6-32, PAN HEAD, BRASS	6	
280	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	18	Y
290	2H1260	• INSULATING BUSHING	12	
300	B-6641-265	• NUT, HEX, BRASS	6	Y
305	102856-C06	• NUT, SELF-LOCKING, THIN	6	Y
890	103957	• WIRE HARNESS - KIT	2	Y
900	B-3852-2-0	• • STRAP, TIEDOWN, PLASTIC	1	Y
910	B-3852-2-0	• • STRAP, TIEDOWN, PLASTIC	1	Y
975	101902	• • TERMINAL, RING	3	
975A	7931-320619	• • AMP 320619 PIDG RING TERMINAL ALTERNATE FOR ITEM 975	3	
975B	7931-2-320619-1	• • AMP 320619 PIDG RING TERMINAL ALTERNATE FOR ITEM 975	3	
1325	B-3852-5-0	• • STRAP, TIEDOWN, PLASTIC	1	Y
1330	B-3852-1-0	• • STRAP, TIEDOWN, PLASTIC	4	Y
	SAE-AMS-I-7444	• • CLEAR VINYL TUBING		
1305	B-3834-0663	• WASHER	2	
1300	B-6265	• BRACKET, WIRE HARNESS	2	
1830	B-3599	• NUT/ 3/8/24, HEX, SELF-LOCKING, THIN	2	
895	3H1452	• WIRE HARNESS, SLIP RING	2	
1820	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	2	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 103719**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103719**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**103769**

**CI.     Installation Instruction 11CI**

- (1) If the counterweight clamp has a spring pin hole (refer to Figure CI-1), fill the hole with RTV CM92.
- (2) Install the bracket (1300) and the existing washer on the existing hub clamping bolt between the hub and the existing nut in accordance with Figure CI-2.
  - (a) Position the bracket as shown in Figure CI-3.
  - (b) Torque the existing nut to 31-37 Ft-Lbs (42.03-50.16 N•m).
- (3) Using the screw (220), washer (200), and terminal strip spacer (240), attach the terminal strip (170) to the bulkhead adapter plate in accordance with Figure CI-4.
  - (a) Torque the screws to 10-12 In-Lbs (1.12-1.35 N•m).
- (4) Using the screws (1170), attach the slip ring (1140) and the bulkhead to the hub as shown in Figure CI-5.
  - (a) Torque each screw (1170) 96-120 In-Lbs (10.1-13.5 N•m).
  - (b) Perform slip ring run-out check in accordance with the Check chapter of this manual.
- (5) Position the propeller blades at reverse blade angle.
- (6) Using the screw (320), washer (330) and terminal strip spacer (340), attach the terminal strip (310) to the counterweight in accordance with Figure CI-6.
  - (a) Torque the screws to 10-12 In-Lbs (1.12-1.35 N•m).
- (7) Route the terminal ends of the de-ice boot lead wires through the hole in counterweight, as shown in Figure CI-7.
- (8) Install the de-ice boot lead wires and de-ice wire harness (890) to the terminal strip (310) in accordance with Figure CI-6 and Figure CI-7.
  - (a) Tighten the terminal strip screws until snug.
- (9) Secure the de-ice boot lead wire to the counterweight:
  - (a) Center the clear vinyl tubing on the de-ice boot lead wire.
  - (b) Route the tie strap (930) through the counterweight hole and over the clear vinyl tubing on the de-ice boot lead wire on both sides of the counterweight.
    - 1 Position the tie strap head in the approximate location shown in Figure CI-7. Snug but do not tighten at this time.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**103769**

**CI.**    Installation Instruction 11CI - continued

- (c) Route the tie strap (910) over the clear vinyl tubing on the de-ice boot on both sides of the counterweight outboard of the terminal strip.
  - 1    Position the tie strap head in the approximate location shown in Figure CI-6. Snug but do not tighten at this time.
- (d) Secure the tie strap (910) to de-ice boot lead wires by installing two tie straps (930) around the de-ice boot lead wires and the tie strap (910) in two locations on each side of the counterweight as shown in Figure CI-7.
  - 1    Position the heads of the tie straps (930) head in the approximate locations shown in Figure CI-6. Snug but do not tighten at this time.
- (10) Make sure that the wire harness (890) is taut through the counterweight hole.
- (11) Tighten all of the tie straps (910 and 930).
- (12) Install the clamp (660) around the wire harness (890) as shown in Figure CI-7.
  - (a) Apply threadlocker CM399 to the threads of the screw (650).
  - (b) Using the screw (650) and washers (655 and 665), install the clamp (660) to the counterweight in accordance with Figure CI-8.
    - 1    Position the clamp (660) in accordance with Figure CI-6.
    - 2    Torque the screw (650) to 22-25 In-Lbs (2.48-2.82 N•m).
- (13) Install the de-ice wire harness (890) on the bracket (1300) with the O-ring as shown in Figure CI-3.
  - (a) Install the tie straps (840) as shown in Figure CI-3.
  - (b) Twisting of the lead wires is not permitted.
- (14) Install the slip ring lead wires (1140) and de-ice wire harness (890) to the terminal strip (170) in accordance with Figure CI-3 and Figure CI-4.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103769**



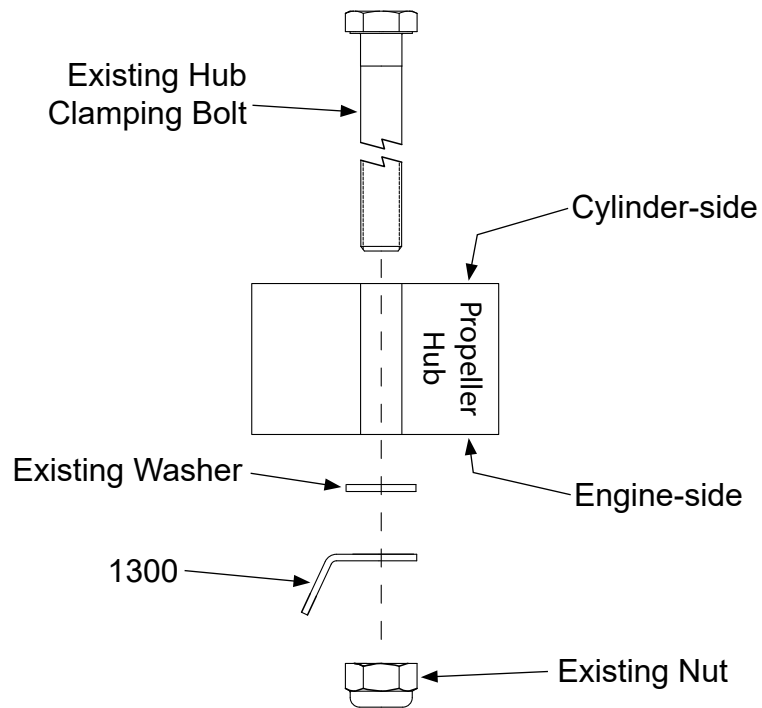
TPI-135-E7486

**Counterweight Clamp: Spring Pin Hole Location  
Figure CI-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**103769**

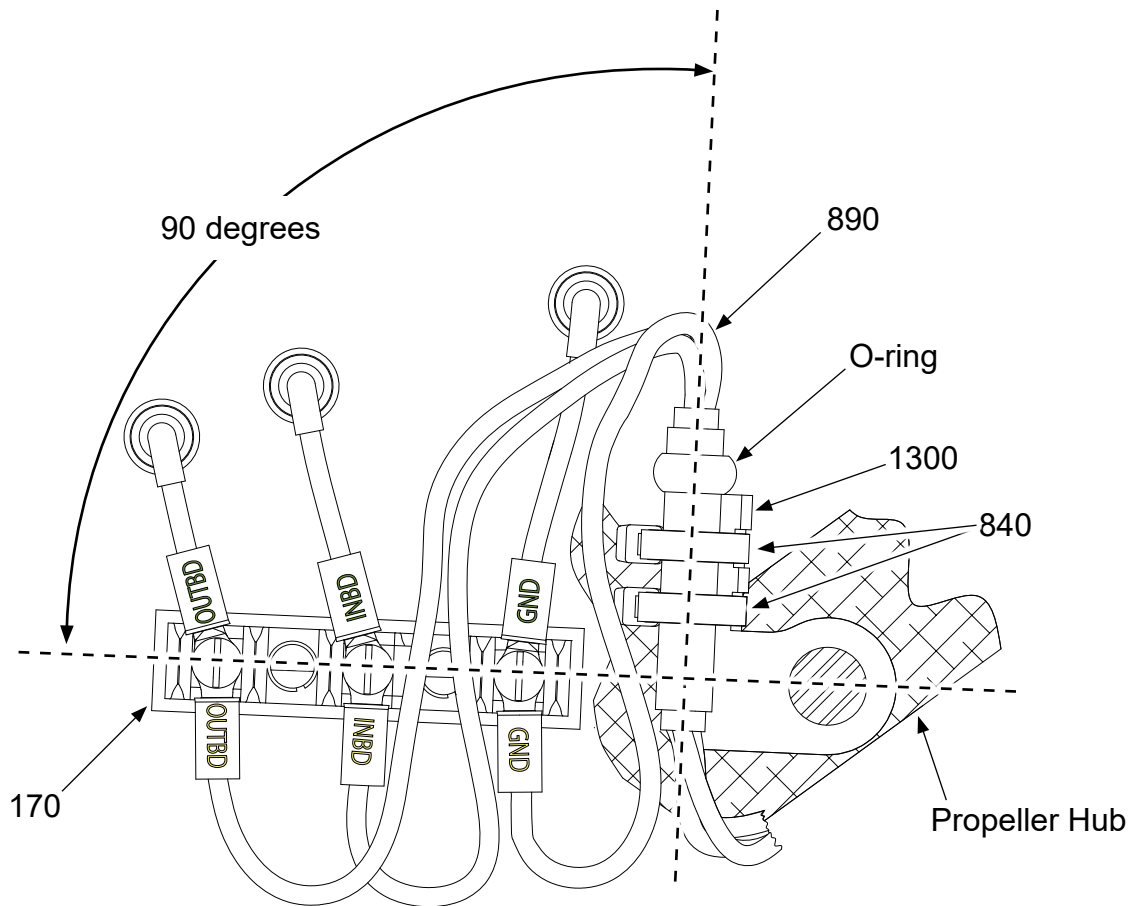


**Wire Harness Bracket  
Figure CI-2**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103769**

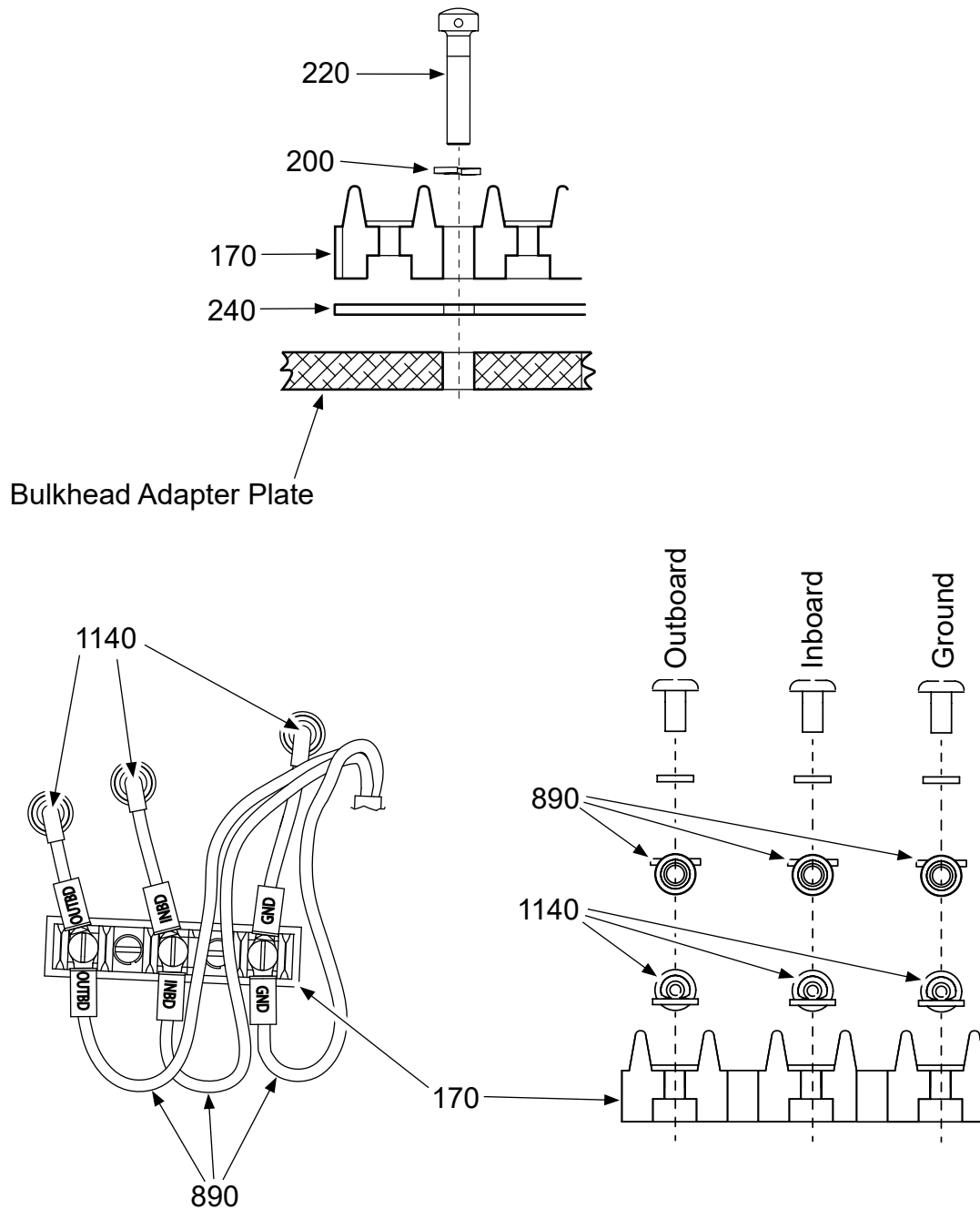


TP-1-MB-0665

**Wire Harness Bracket Alignment  
Figure CI-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

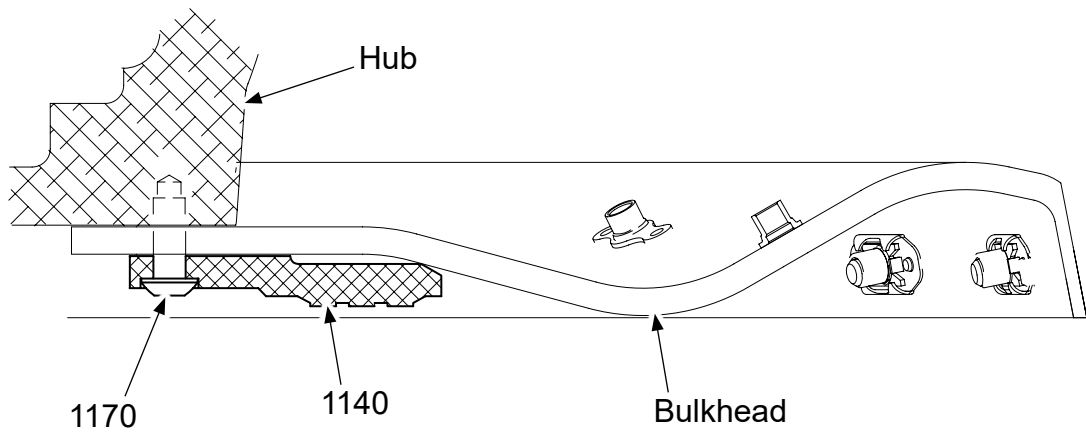
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103769**



**Terminal Strip: Bulkhead Mounted  
Figure CI-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103769**

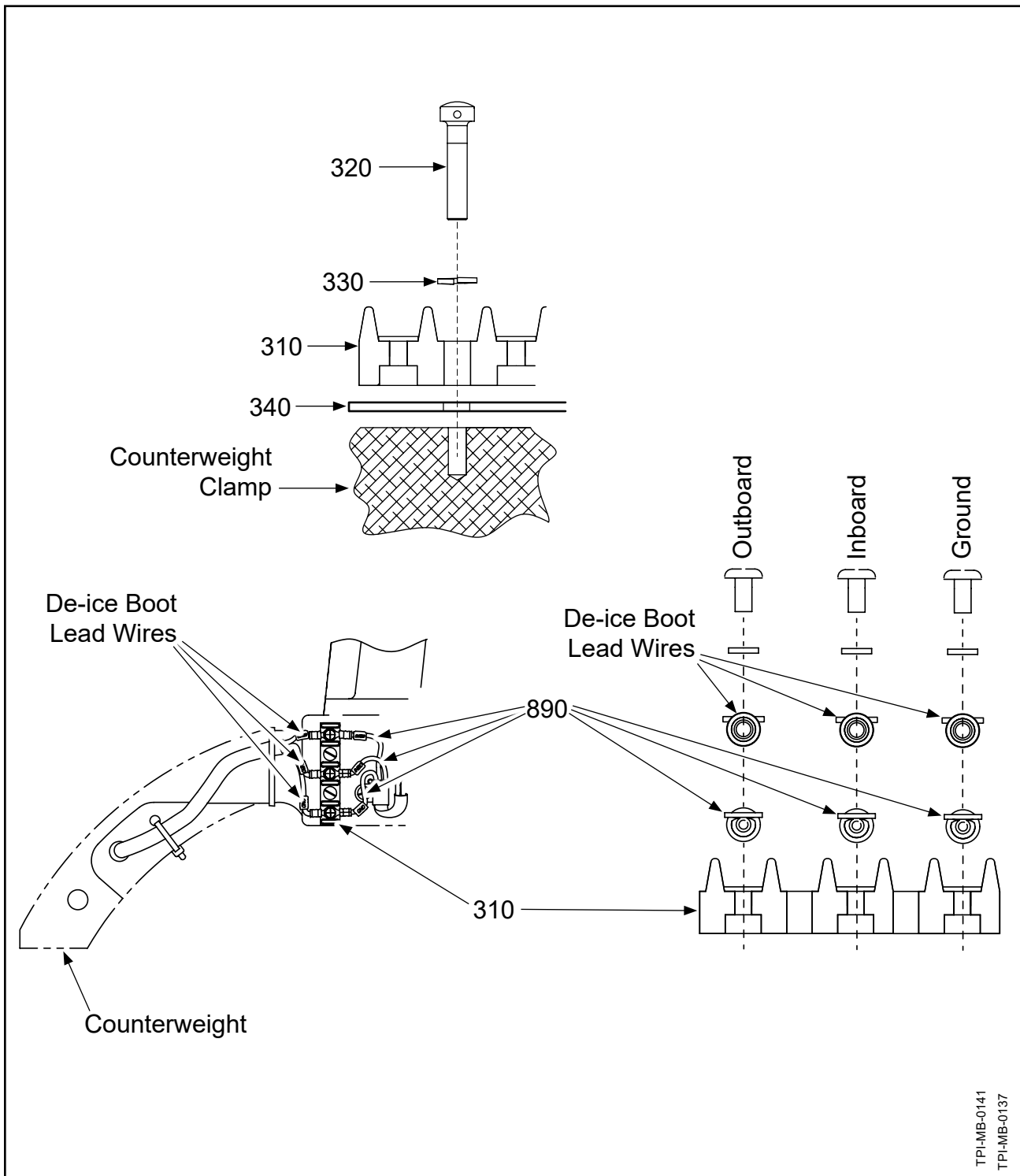


TPL-MB-0223

**Slip Ring Mounting  
Figure CI-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

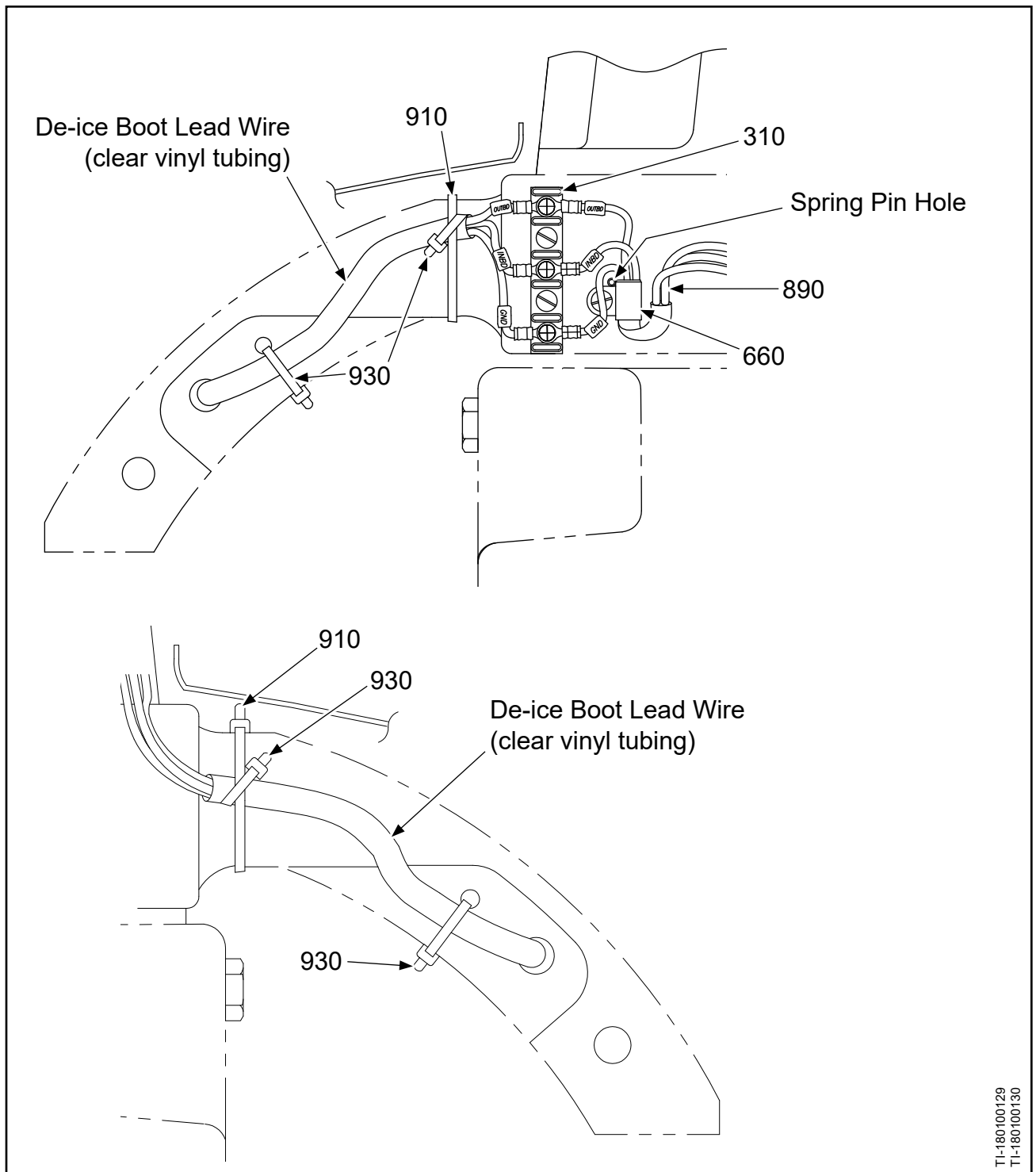
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103769**



**Terminal Strip: Counterweight Mounted  
Figure CI-6**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

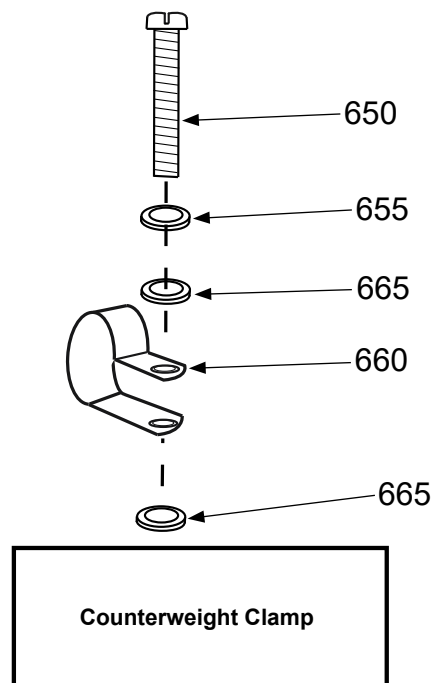
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103769**



**Wire Harness to Blade Shank/Counterweight  
Figure CI-7**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103769**



TI-00180ACC.EPS  
TI-00180BCC.EPS

**Loop Clamp to Counterweight/Blade Shank Hardware Configuration  
Figure CI-8**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103769**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>103769</b>	<b>PROPELLER DE-ICE KIT SUPERSEDES DE-ICE KIT 7931-5E2710-1 INSTALLATION INSTRUCTION 11CI FIGURES: CI-1 thru CI-7</b>		
170	1H1150-2	• TERMINAL STRIP	5	
200	B-3854-41	• WASHER, LOCK	10	Y
220	B-6631-231	• SCREW, 6-32, FILLISTER HEAD, CRES	10	Y
240	2H1852-2	• TERMINAL STRIP SPACER	5	
310	1H1150-2	• TERMINAL STRIP	5	
320	B-6631-231	• SCREW, 6-32, FILLISTER HEAD, CRES	10	Y
330	B-3854-41	• WASHER, LOCK	10	Y
340	2H1852-2	• TERMINAL STRIP SPACER	5	
645	B-3855-31	• DELETED	-	-
650	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	5	Y
655	B-3854-42	• WASHER, LOCK	5	Y
660	B-3853-F5	• CLAMP, LOOP, PLASTIC	5	Y
665	B-3837-N832	• WASHER, CORROSION RESISTANT	10	Y
670	B-3842-0500	• DELETED	-	
840	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	10	Y
890	3H2526-2	• WIRE HARNESS	5	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	5	Y
925	B-3852-1-0	• DELETED	-	-
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	15	Y
1140	4H4069-1	• SLIP RING ASSEMBLY	1	
1170	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	10	Y
1300	B-6265	• BRACKET, WIRE HARNESS	5	

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 103769**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**103769**

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This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**104116**

**CJ. Installation Instruction 11CJ**

- (1) Using the screws (1170), Belleville spring washers (1180), washers (1200), and nuts (1190), attach the slip ring (1140) to the spinner split mounting plate as shown in Figure CJ-1.
  - (a) Torque the screws (1170) to 96-120 in. lb. (10.1-13.5 N•m).
- (2) Perform slip ring run-out check in accordance with the Check chapter of this manual.
- (3) Position the propeller blades at high blade angle.
- (4) Assemble the plug connection between the wire harness (890) and the de-ice boot.
- (5) Install the tie strap (920) around the wire harness/de-ice boot plug connection. Do not tighten at this time.
- (6) Secure the wire harness/de-ice boot connection to the clamp.
  - (a) Install two tie straps (930) under the tie strap (920), and over the wire harness/de-ice boot plugs, and around the clamp as shown in Figure CJ-2. Do not tighten at this time.
  - (b) Position the two tie straps (930) outboard of the lubrication fitting.
  - (c) Position the tie strap heads in the approximate location shown on the side of the clamp as shown in Figure CJ-2. Do not tighten the tie straps (930) at this time.
- (7) Route the wire harness (890) over the inboard tie strap (930) and under the outboard tie strap (930) as shown in Figure CJ-2.
- (8) Using a tie strap (920), secure the de-ice boot lead wire to the outboard tie strap (930) as shown in Figure CJ-2. Do not tighten at this time.
- (9) The tie strap (910) around the blade shank must be located as shown in Figure CJ-2. Do not tighten at this time.
- (10) Position the wire harness/de-ice boot plug connection as shown in Figure CJ-2.
- (11) Tighten all the tie straps (910, 920 and 930).
- (12) Using screws (220) and washers (200) attach the terminal strip (170) to the bulkhead in accordance with Figure CJ-3.
  - (a) Torque the screws (220) to 10-12 in. lb. (1.12-1.35 N•m).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**104116**

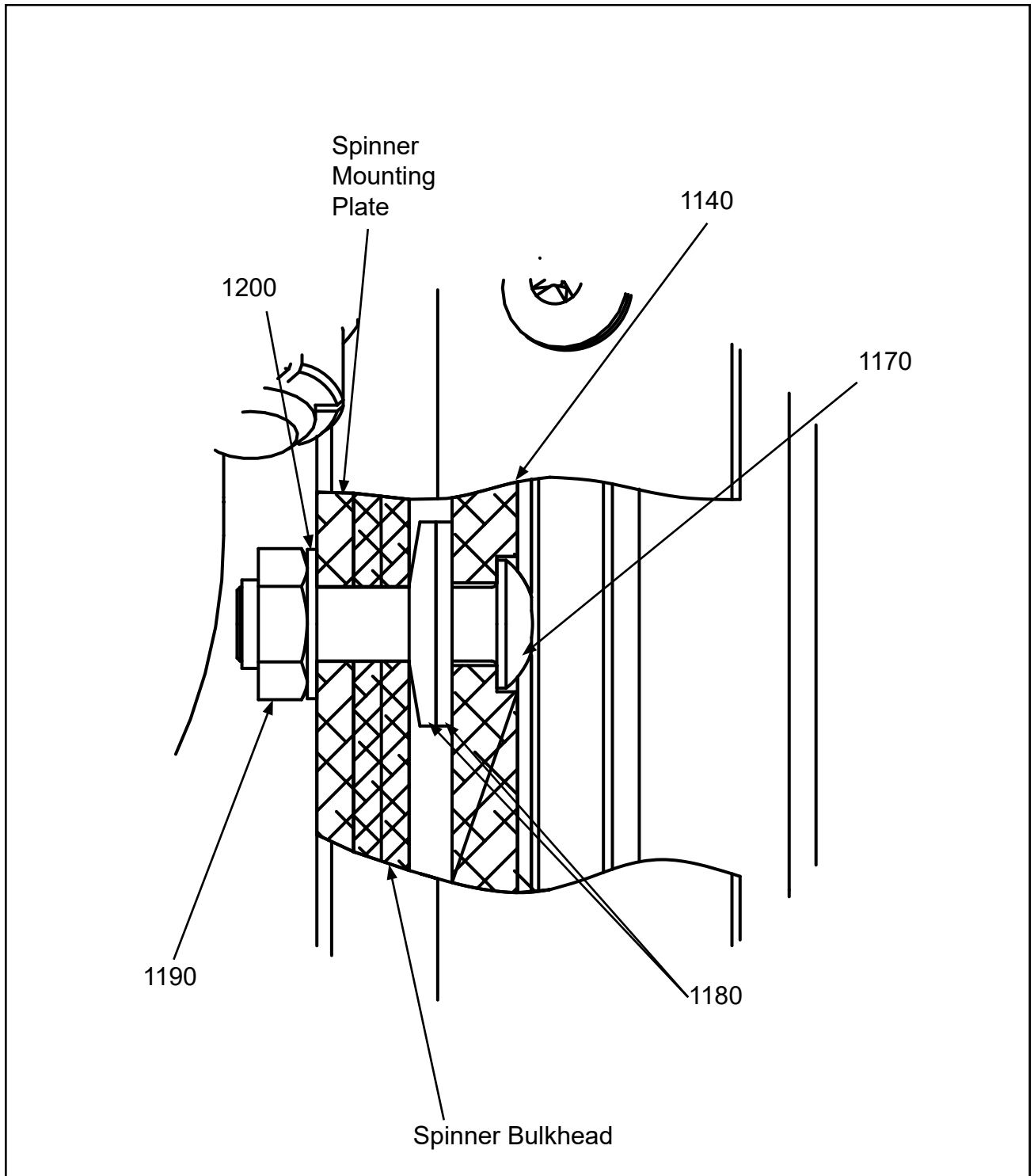
CJ. Installation Instruction 11CJ - continued

- (13) Install the slip ring lead wires and de-ice wire harness (890) to the terminal strip (170) in accordance with Figure CJ-3.
  - (a) Tighten the terminal screws until snug.
- (14) Install the clamp (590) around the wire harness (890) as shown in Figure CJ-4.
- (15) Using screws (610), washers (630), and nuts (600), install the clamp (590) to the bulkhead in accordance with Figure CJ-4.
  - (a) Orient the centerline of the clamp (590) parallel to terminal strip (170).
  - (a) Torque the screw (610) to 22-25 in. lbs. (2.48-2.82 N•m).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**104116**

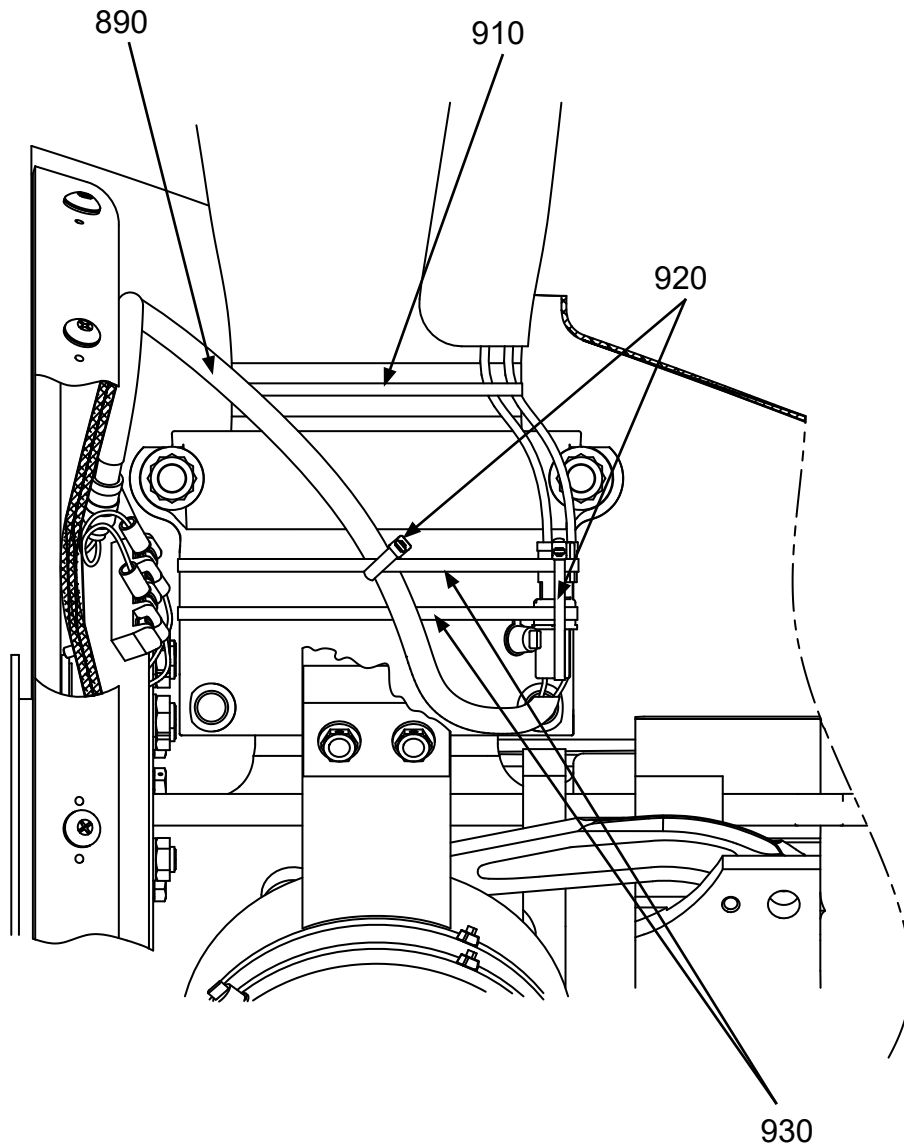


**Slip Ring Mounting  
Figure CJ-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**104116**



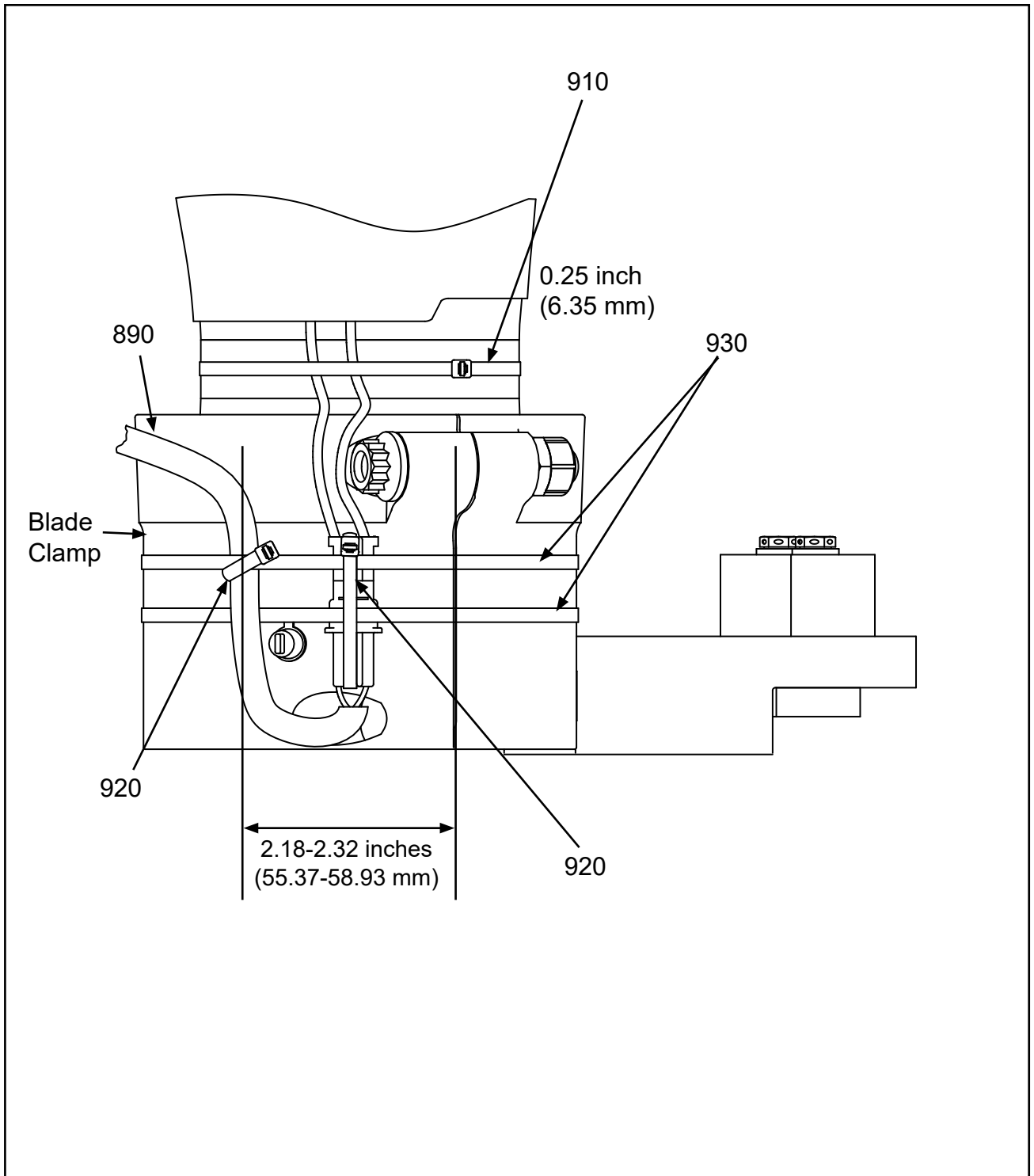
The actual location of the de-ice boot lead wires may vary  
depending on the installed de-ice boot.

**Wire Harness and Tie Straps to Clamp**  
**Figure CJ-2, page 1 of 2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**104116**

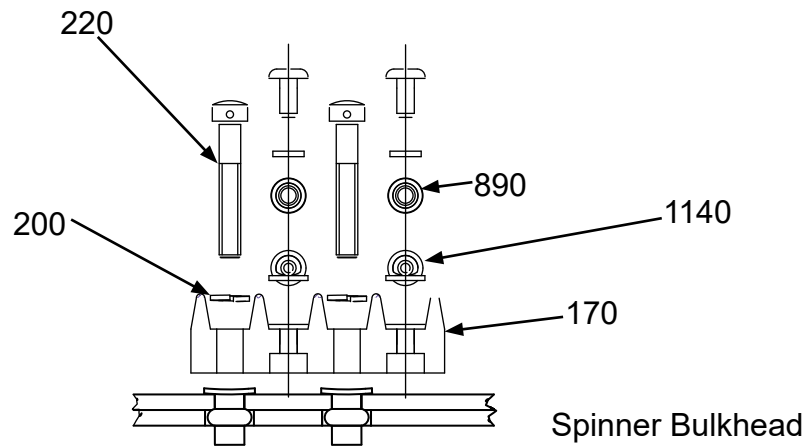
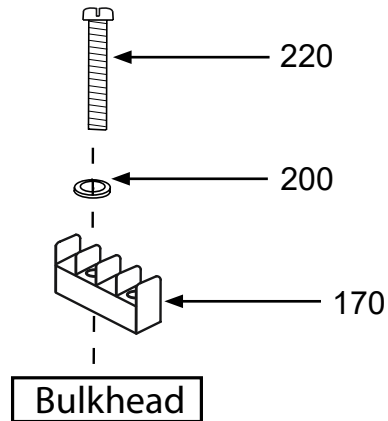


**Wire Harness and Tie Straps to Clamp**  
**Figure CJ-2, page 2 of 2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**104116**



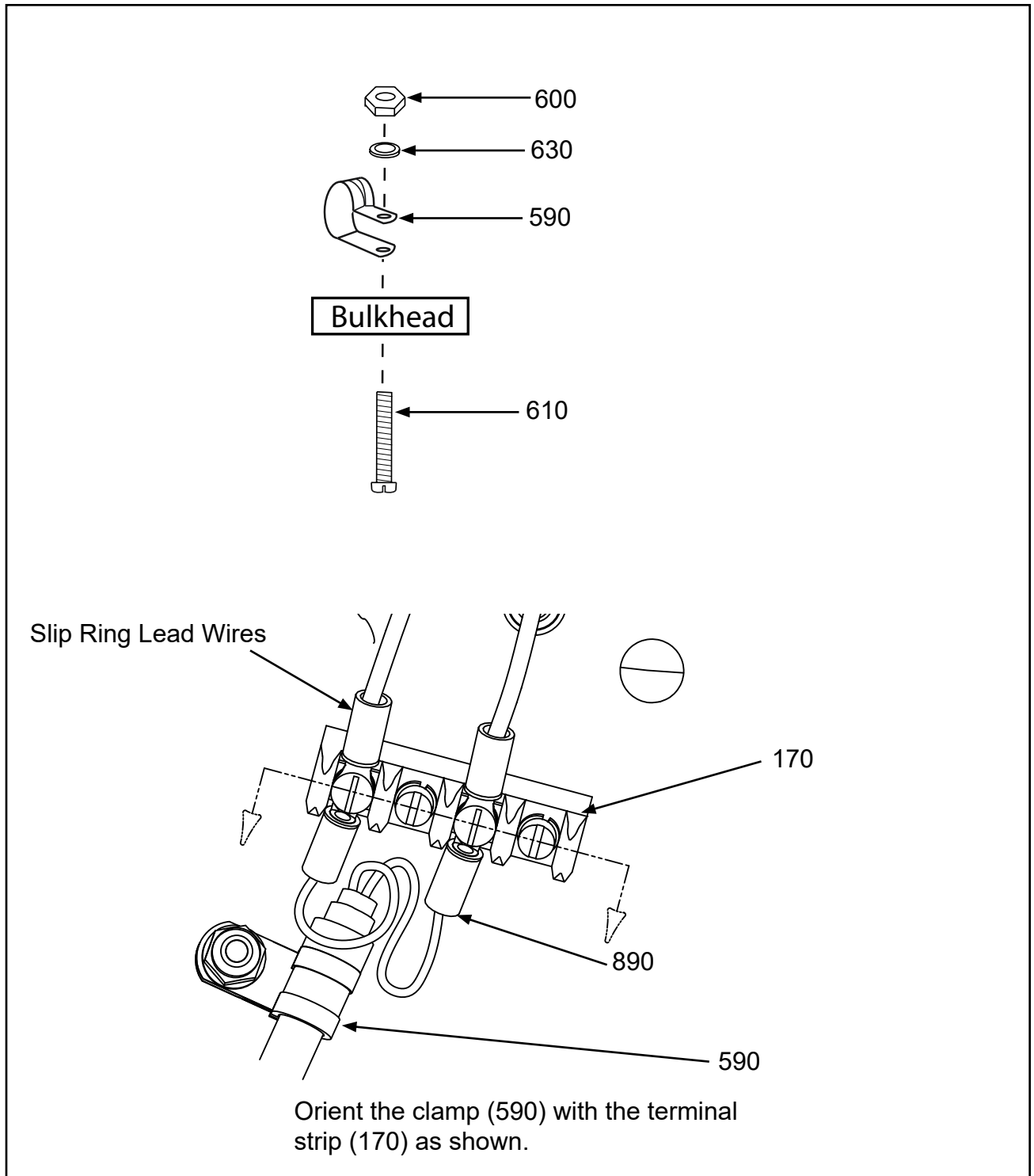
**Typical Two Wire Configuration**

**Terminal Strip  
Figure CJ-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**104116**



**Loop Clamp to Bulkhead Orientation  
Figure CJ-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**104116**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>104116</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11CJ FIGURES: CJ-1 thru CJ-4</b>		
170	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM	3	
200	B-3854-41	• WASHER, LOCK	6	Y
220	B-6631-233	• SCREW, 6-32, FILLISTER HEAD, CRES	6	Y
590	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	3	Y
600	B-6655-08	• NUT, HEX, SELF-LOCKING	3	Y
610	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	3	Y
630	B-3837-N832	• WASHER, CORROSION RESISTANT	3	Y
890	3H2092-2	• WIRE HARNESS	3	Y
910	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	3	Y
920	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	6	Y
930	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	6	Y
1140	4H2551-1	• SLIP RING ASSEMBLY	1	
1170	A-2070-8	• SCREW, 1/4-28, BUTTON HEAD	12	Y
1180	B-7077-52	• BELLEVILLE SPRING WASHER	24	Y
1190	B-3808-4	• NUT, HEX, SELF-LOCKING	12	Y
1200	B-3837-0432	• WASHER, CORROSION RESISTANT	12	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 104116**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

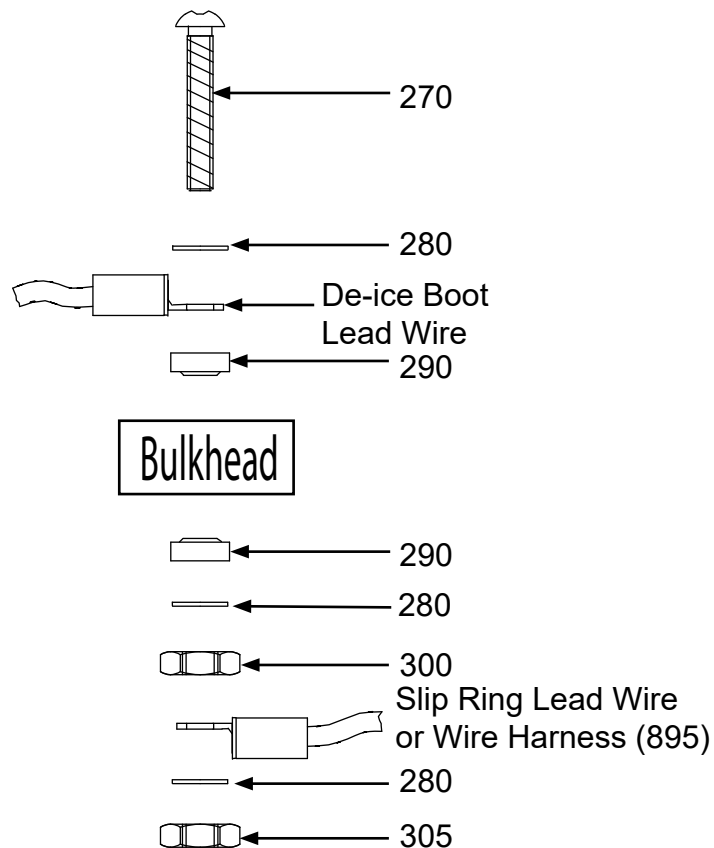
**104179**

CK. Installation Instruction 11CK

- (1) Connect the staggered leads of the slip ring wire harness (895) to the slip ring in accordance with the Aircraft Maintenance Manual.
- (2) Connect the de-ice boot lead wires and the slip ring wire harness leads that are the same length, to the bulkhead using Figure CK-1, Figure CK-2, and Figure CK-3.
- (3) Torque the nut (300) to 6-8 in. lbs. (0.6-0.9 N•m).
- (4) Torque the nut (305) to 10-12 in. lbs. (1.1-1.3 N•m).
- (5) Use the lead clip to secure the de-ice boot lead strap to the bulkhead using Figure CK-2, Figure CK-3 and Figure CK-4.
- (6) Tighten the nut (380) until snug.
- (7) Attach the slip ring wire harness (895) to the hub with the tie straps (1820) as shown in Figure L-5.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

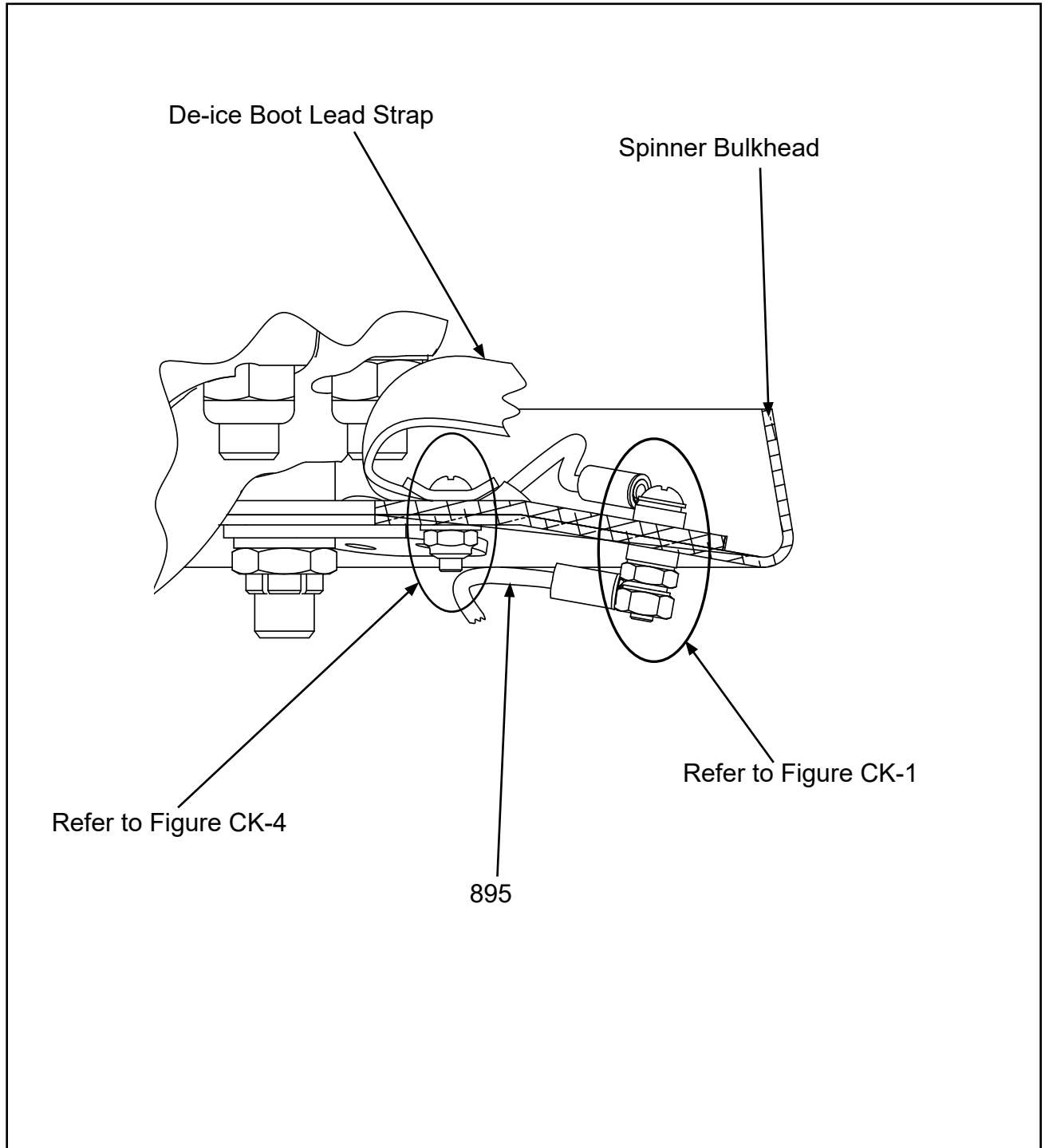
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**104179**



**De-ice Boot Lead Wire and Slip Ring Lead Wire or Wire Harness to Bulkhead  
Figure CK-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**104179**

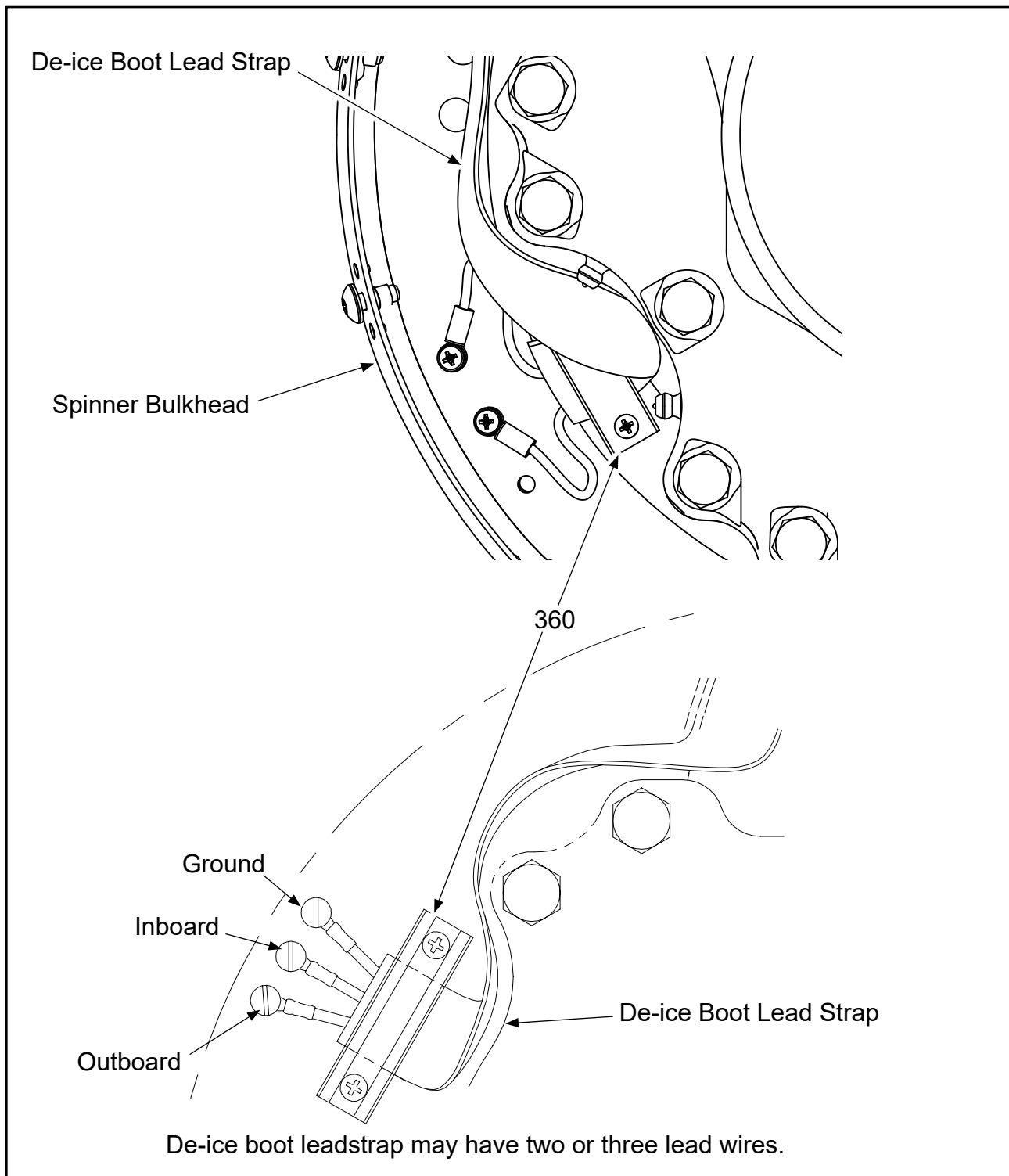


**Lead Clip and De-ice Boot Lead Strap and Lead Wire Attachment to Bulkhead  
Figure CK-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

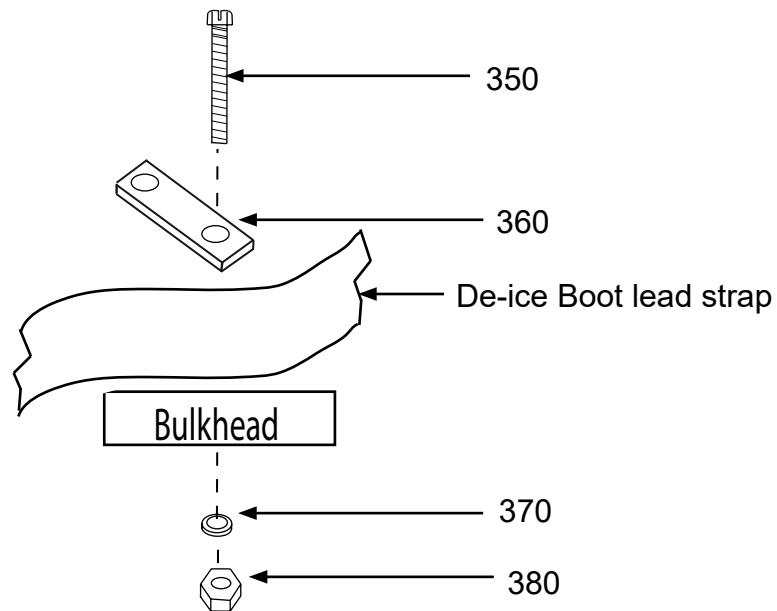
**104179**



**Lead Clip and De-ice Boot Lead Strap and Lead Wires Attachment to Bulkhead  
Figure CK-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

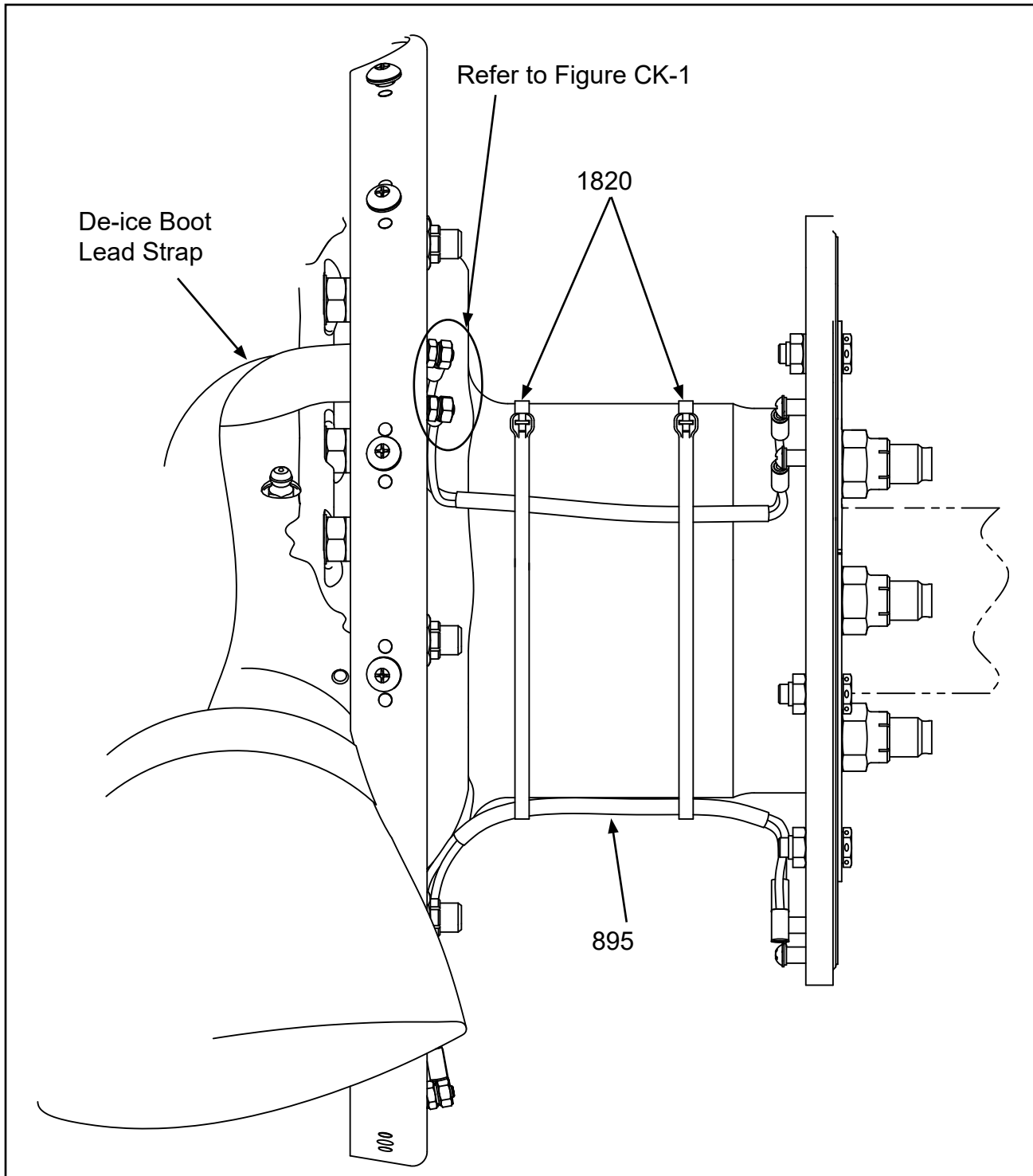
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**104179**



**Lead Clip Attachment to Bulkhead  
Figure CK-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**104179**



**Securing Slip Ring Wire Harness to Hub  
Figure CK-5**

# **HARTZELL ICE PROTECTION SYSTEM MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**104179**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>104179</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11CK</b> <b>FIGURES: CK-1 thru CK-5</b>		
270	B-7035-14	• SCREW, 6-32, PAN HEAD, BRASS	6	
280	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	18	Y
290	2H1260	• BUSHING, INSULATING	12	
300	B-6641-265	• NUT, HEX, BRASS	6	
305	102856-C06	• NUT, HEX, BRASS	6	
350	B-6637-30	• SCREW, PAN HEAD, CRES.	6	
360	3H1271-2	• CLIP, LEAD STRAP	3	
370	B-3837-N632	• WASHER, CORROSION RESISTANT	6	Y
380	B-6655-06	• NUT, HEX, SELF-LOCKING	6	Y
895	104162	• WIRE HARNESS, SLIP RING	3	Y
1820	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	3	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 104179**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**104179**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**104251**

**CL.    Installation Instruction 11CL**

- (1) Using the bolts (1170 and 1155), Belleville spring washers (1180), washers (1200), and nuts (1190), attach the slip ring (1140) to the spinner split mounting plate as shown in Figure CL-1.

NOTE:    A longer bolt (1155) is required for installation through the start lock.

- (2) Torque the nuts (1190) to 40-120 in. lb. (4.5-13.5 N•m).
- (3) Perform the slip ring run-out check in accordance with the Check chapter of this manual.
- (4) Position the propeller blades at reverse blade angle.
- (5) Assemble the plug connection between the wire harness (890) and the de-ice boot.
- (6) Install the tie strap (910) around the wire harness/de-ice boot plug connection.
- (7) Position the tie strap head as shown in Figure CL-2 and tighten the tie strap.
- (8) Install the clamp (660) around the wire harness (890) as shown in Figure CL-2.
- (9) Using screw (650), and washer (665), install the clamp (660) to the counterweight clamp as shown in Figure CL-3.
- (10) Torque the screw (650) to 22-25 in. lbs. (2.48-2.82 N•m).
- (11) Position the wire harness/de-ice boot connection under the counterweight on the clamp.
  - (a) Install two tie straps (920) under the tie strap (910) and around the counterweight in an "X" configuration as shown in Figure CL-2.
  - (b) Position the heads of the two tie straps (920) as shown in Figure CL-2 and tighten the tie straps.
- (12) Install a tie strap (930) around the blade and over the de-ice boot lead wire 0.125 - 0.375 inch (3.17 - 9.52 mm) from the outboard edge of the counterweight clamp as shown in Figure CL-2.
- (13) Tighten the tie strap (930).
- (14) Install a tie strap (930) around the counterweight clamp and over the de-ice boot lead wire as shown in Figure CL-2. Do not tighten at this time.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**104251**

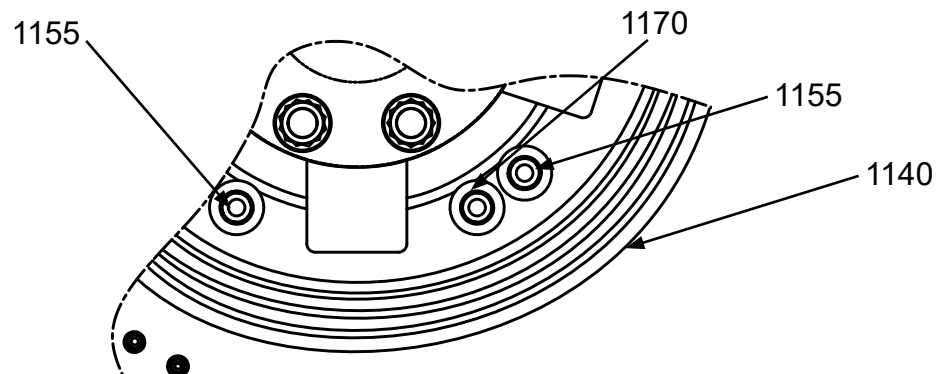
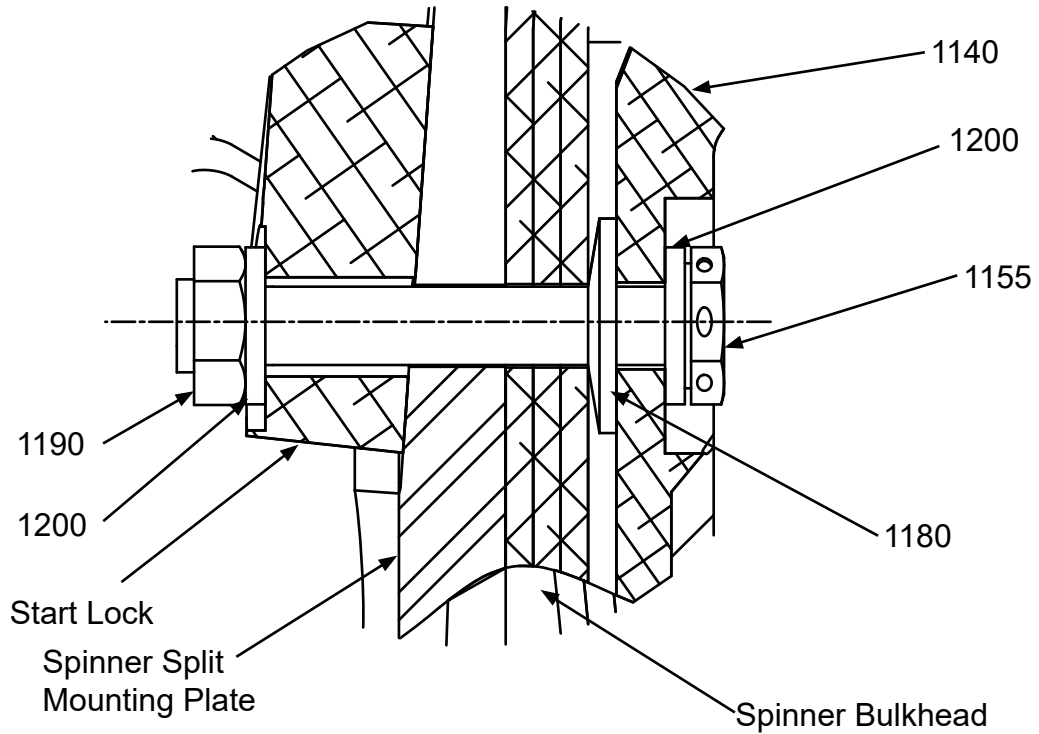
CL. Installation Instruction 11CL - continued

- (15) Position the de-ice boot lead wire towards the counterweight clamp parting line to remove slack in the de-ice boot lead wire.
- (16) Position the head of the tie strap (930) as shown in Figure CL-2.
- (17) Tighten the tie strap (930).
- (18) Using screws (220) and washers (200) attach the terminal strip (170) to the bulkhead as shown in Figure CL-4.
- (19) Torque the screws (220) to 10-12 in. lb. (1.12-1.35 N•m).
- (20) Install the slip ring lead wires and de-ice wire harness (890) to the terminal strip (170) in accordance with Figure CL-4.
- (21) Tighten the terminal screws until snug.
- (22) Install the clamp (590) around the wire harness (890) as shown in Figure CL-5.
- (23) Using screw (610), washers (630), and nut (600), install the clamp (590) to the bulkhead in accordance with Figure CL-5.
- (24) Orient the centerline of the clamp (590) with the "A" screw on the terminal strip (170).
- (25) Torque the screw (610) to 22-25 in. lbs. (2.48-2.82 N•m).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**104251**

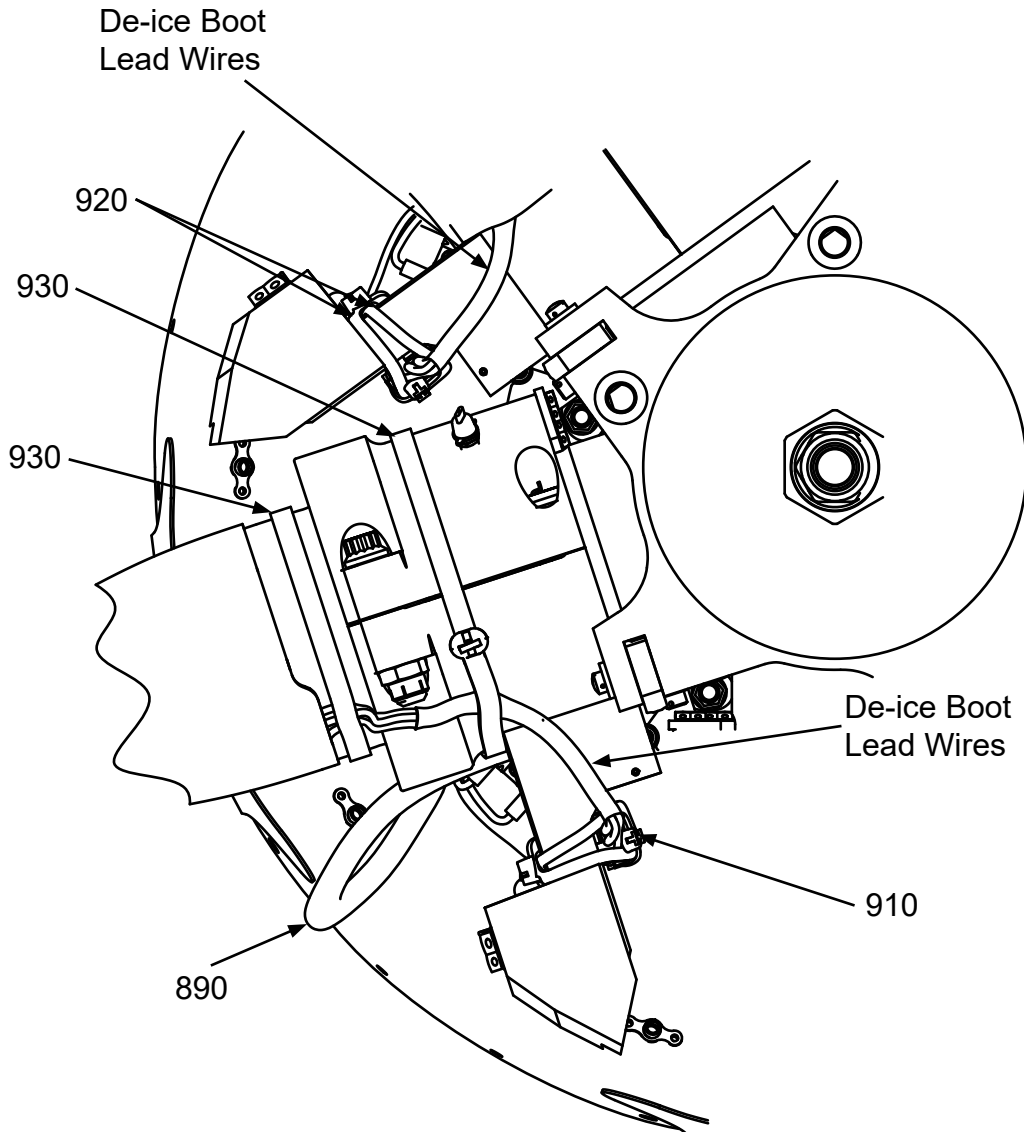


**Slip Ring Mounting  
Figure CL-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**104251**

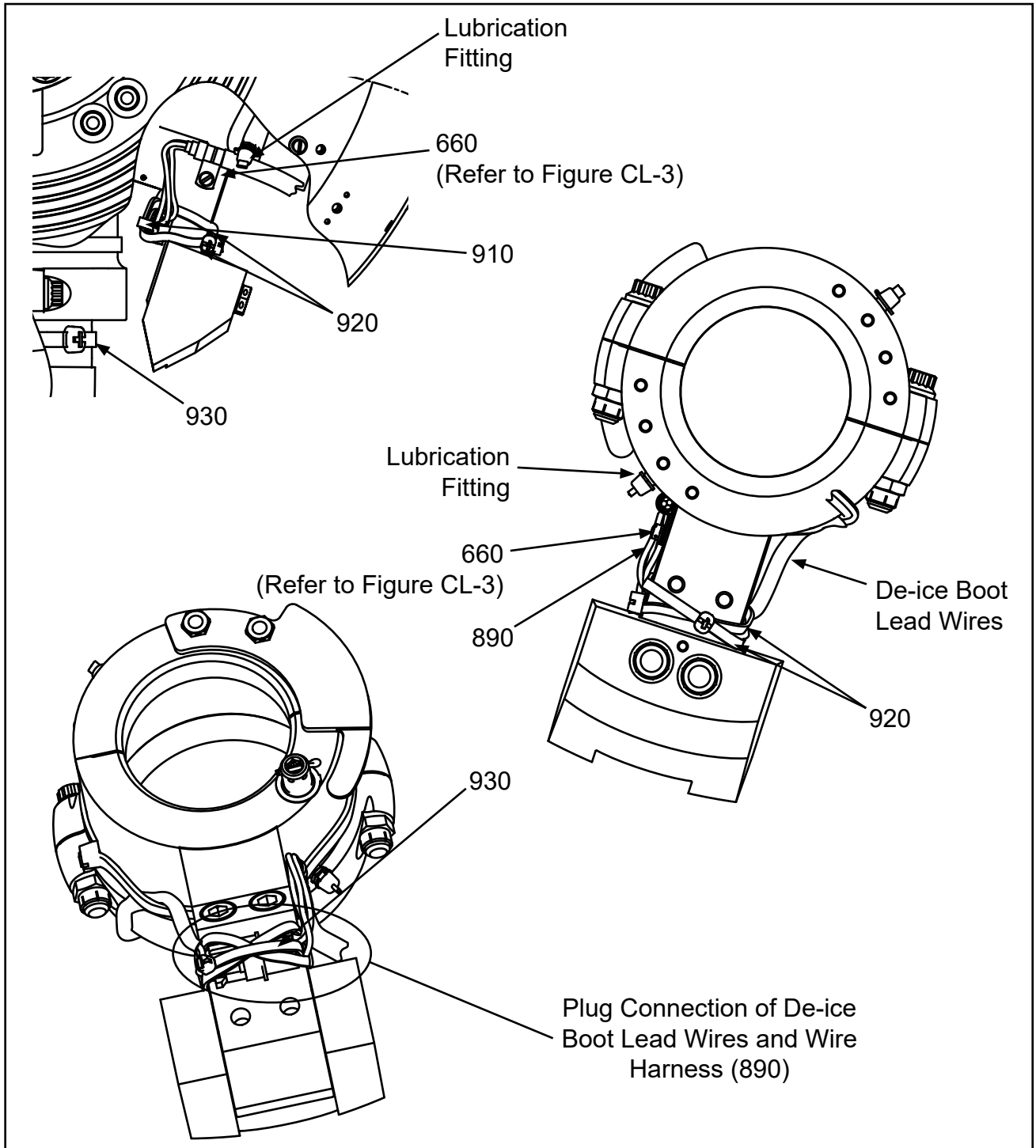


**Wire Harness and Tie Straps to Clamp**  
**Figure CL-2, page 1 of 2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

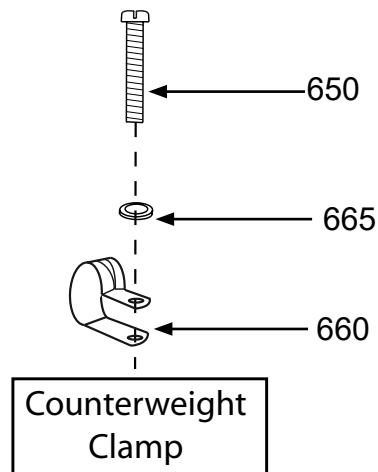
**104251**



**Wire Harness and Tie Straps to Clamp**  
**Figure CL-2, page 2 of 2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**104251**



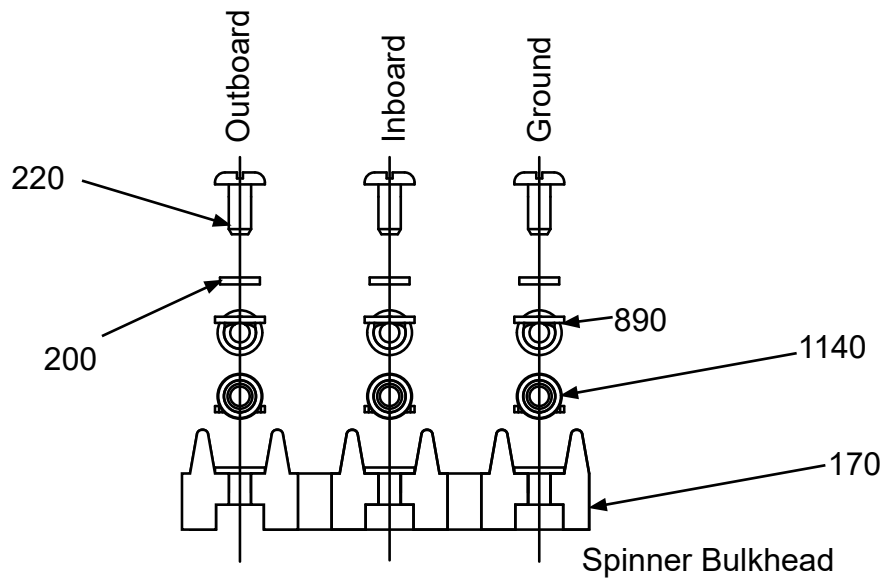
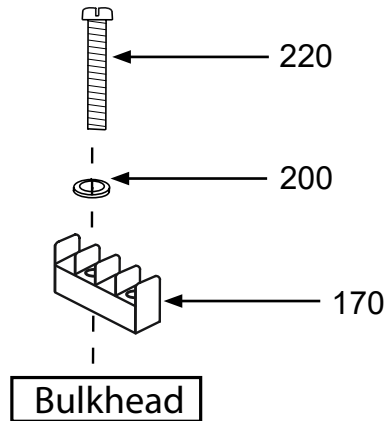
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**Loop Clamp to Counterweight Clamp Attachment  
Figure CL-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**104251**



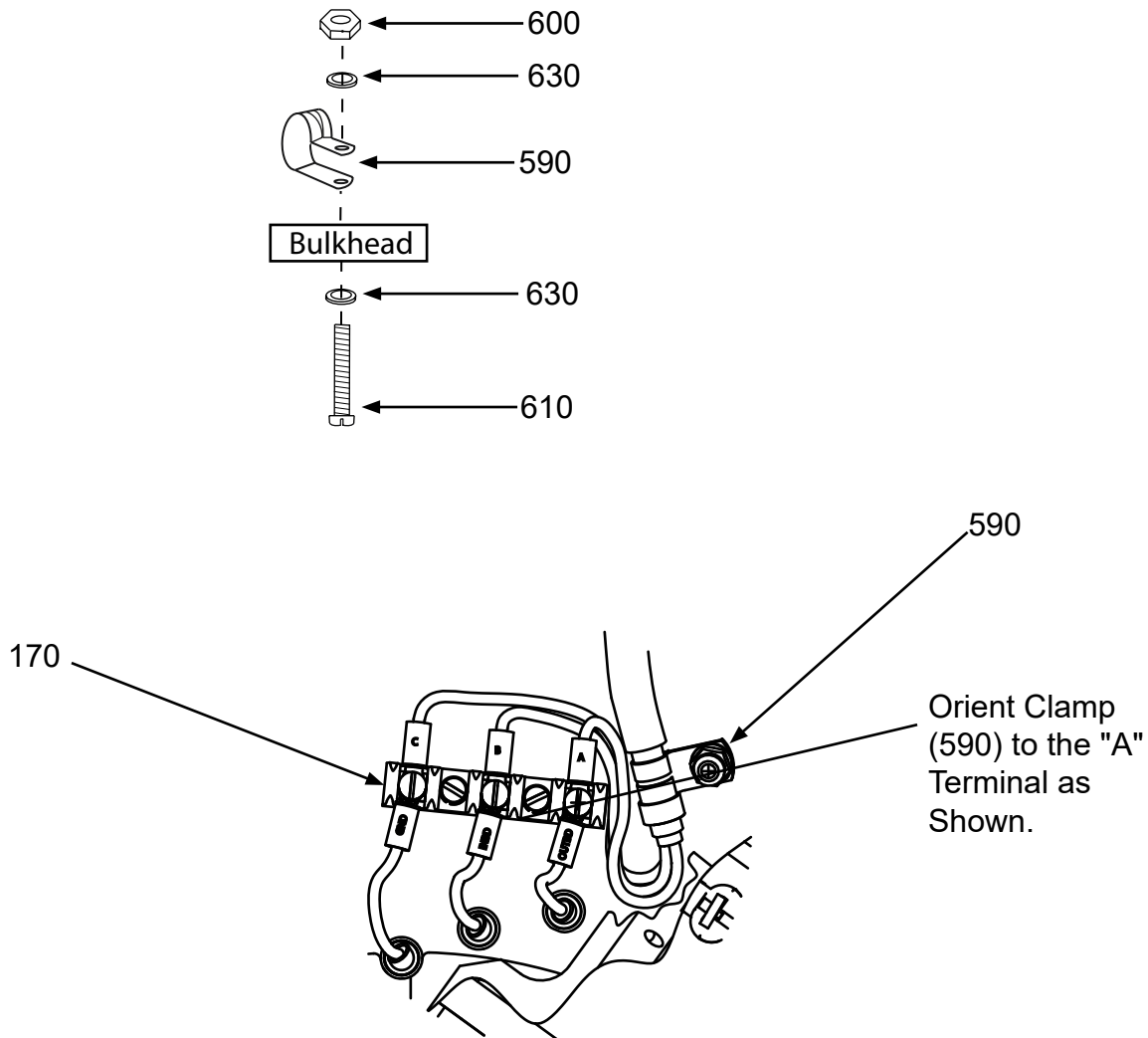
**Typical Three Wire Configuration**

**Terminal Strip  
Figure CL-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**104251**



**Orientation of the Loop Clamp to Terminal Strip on the Bulkhead  
Figure CL-5**



# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**104251**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>104251</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11CL</b> <b>FIGURES: CL-1 thru CL-5</b>		
170	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM	5	
200	B-3854-41	• WASHER, LOCK	10	Y
220	B-6631-233	• SCREW, 6-32, FILLISTER HEAD, CRES	10	Y
590	B-6735	• CLAMP, LOOP, CUSHIONED	5	Y
600	B-6655-08	• NUT, HEX, SELF-LOCKING	5	Y
610	B-3856-247	• SCREW, 8-32, FILLISTER HEAD, CRES	5	Y
630	B-3837-N832	• WASHER, CORROSION RESISTANT	10	Y
650	B-3856-243	• SCREW, 8-32, FILLISTER HEAD, CRES	5	Y
660	B-6735	• CLAMP, LOOP, CUSHIONED	5	Y
665	B-3854-42	• WASHER, LOCK	5	Y
890	104240	• WIRE HARNESS	5	Y
910	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	5	Y
920	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	10	Y
930	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	10	Y
1140	104249	• SLIP RING ASSEMBLY	1	
1155	B-3384-21H	• BOLT, 1/4-28, HEX HEAD	5	Y
1170	B-3384-16H	• BOLT, 1/4-28, HEX HEAD	5	Y
1180	B-7077-52	• BELLEVILLE SPRING WASHER	10	Y
1190	B-3808-4	• NUT, HEX, SELF-LOCKING	10	Y
1200	B-3837-0463	• WASHER, CORROSION RESISTANT	20	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 104251**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**104251**

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This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**104264**

CM. Installation Instruction 11CM

- (1) Install the existing hub washer, hub clamping nut (1830), washers (1305), and bracket (1300), to the hub clamping bolt in accordance with Figure CM-1.
- (2) Position the bracket (1300) parallel to the blade. Refer to Figure CM-2.
- (3) Torque the nut to 22-25 Ft-Lbs (29-33 N•m).
- (4) Using screws (220), washers (200), terminal strip spacer (240), and tapped eyelets (190), attach the terminal strip (170) to the bulkhead. Refer to Figure CM-3.
- (5) Torque the screws to 10-12 In-Lbs (1.12-1.35 N•m).
- (6) Position the propeller blades at reverse blade angle.
- (7) Using screws (320), terminal strip spacer (340), and washers (330), attach the terminal strip (310) to the counterweight. Refer to Figure CM-4 and Figure CM-5.
- (8) Torque the screws to 10-12 In-Lbs (1.12-1.35 N•m).
- (9) Install the de-ice boot lead wires and de-ice wire harness lead wires (890) to the terminal strip (310) in accordance with Figure CM-4, typical three wire installation. Tighten the terminal screws until snug.
- (10) Press the spring pin (670) perpendicularly into the hole as shown in Figure CM-5. The spring pin (670) must extend from the counterweight surface to a height of 0.23 - 0.27 inch (5.8 - 6.8 mm).
- (11) Install the clamp (660), around the wire harness (890) as shown in Figure CM-5.
- (12) Apply threadlocker CM399 to the threads of the screw (650). Install the clamp (660) and washers (655 and 665) on the screw (650).
- (13) Using screw (650) and washers (655 and 665), install the clamp (660) to the counterweight in accordance with Figure CM-5.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**104264**

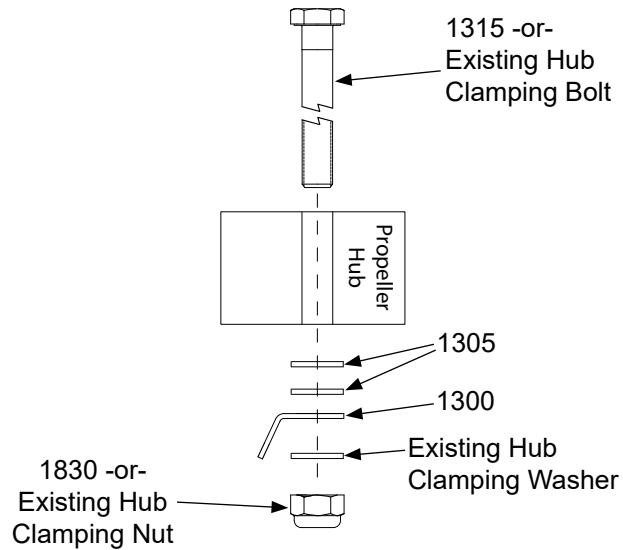
CM. Installation Instruction 11CM - continued

- (14) Position the clamp against the spring pin (670).
- (15) Torque the screw (650) to 22-25 In-Lbs (2.48-2.82 N•m).
- (16) Position the wire harness (890) on the bracket (1300) with the O-ring as shown in Figure CM-6.
- (17) Install the slip ring harness lead wires (895) and de-ice wire harness (890) to the bulkhead terminal strip (170) in accordance with Figure CM-3, typical three wire installation.
- (18) Tighten the terminal screws until snug.
- (19) Attach the terminals of the de-ice boot leadstrap to the slip ring assembly using the following steps:
  - (a) Connect the de-ice boot leadstrap "A" terminal to the outboard terminal of the slip ring assembly.
  - (b) Connect the de-ice boot leadstrap "B" terminal to the inboard terminal of the slip ring assembly.
  - (c) Connect the de-ice boot leadstrap "C" terminal to the ground terminal of the slip ring assembly.
- (20) Using the tie straps (930), secure the de-ice boot leadstrap to the hub as shown in Figure CM-6.
- (21) Cycle the propeller from low angle to high angle to verify that the wire harness installation is not obstructed during cycling.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**104264**

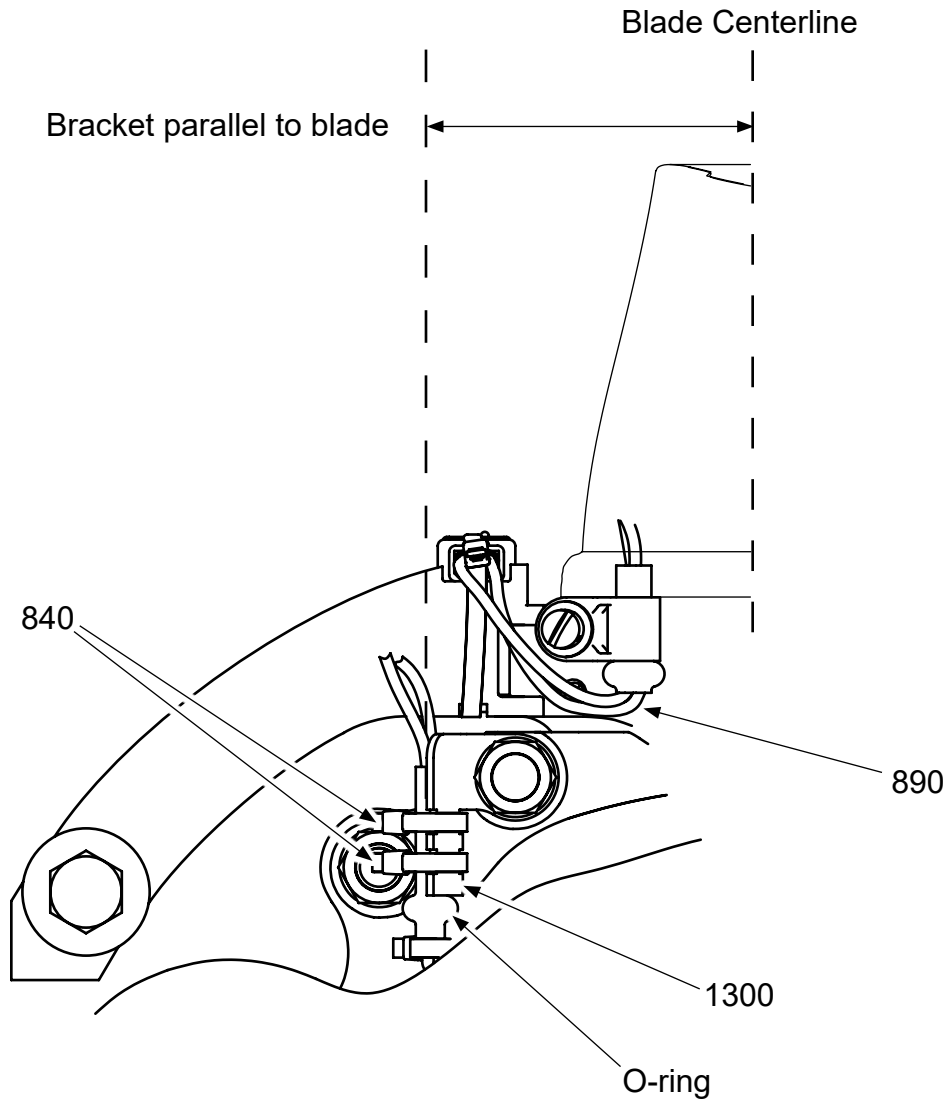


**Wire Harness Bracket Hardware Configuration  
Figure CM-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**104264**



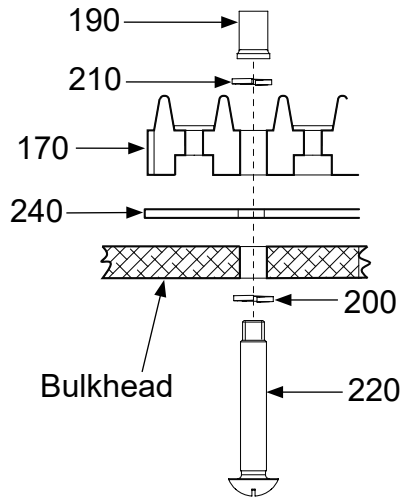
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**Wire Harness Bracket Alignment  
Figure CM-2**

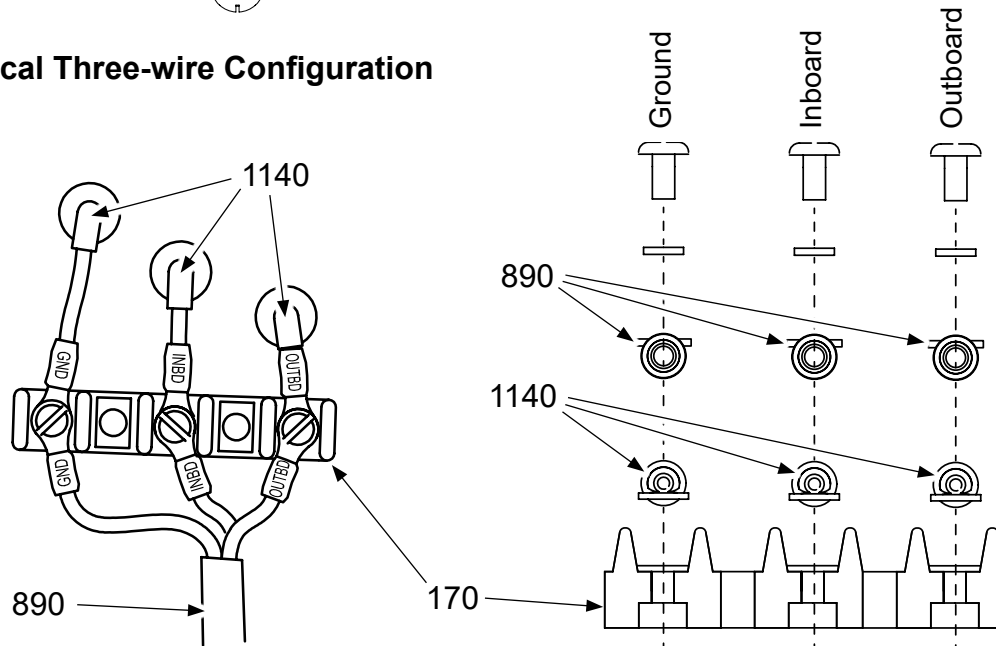
# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**104264**



## Typical Three-wire Configuration



**NOTE:** The illustrations show slip ring wires on a  
typical right-hand (rotation) propeller.

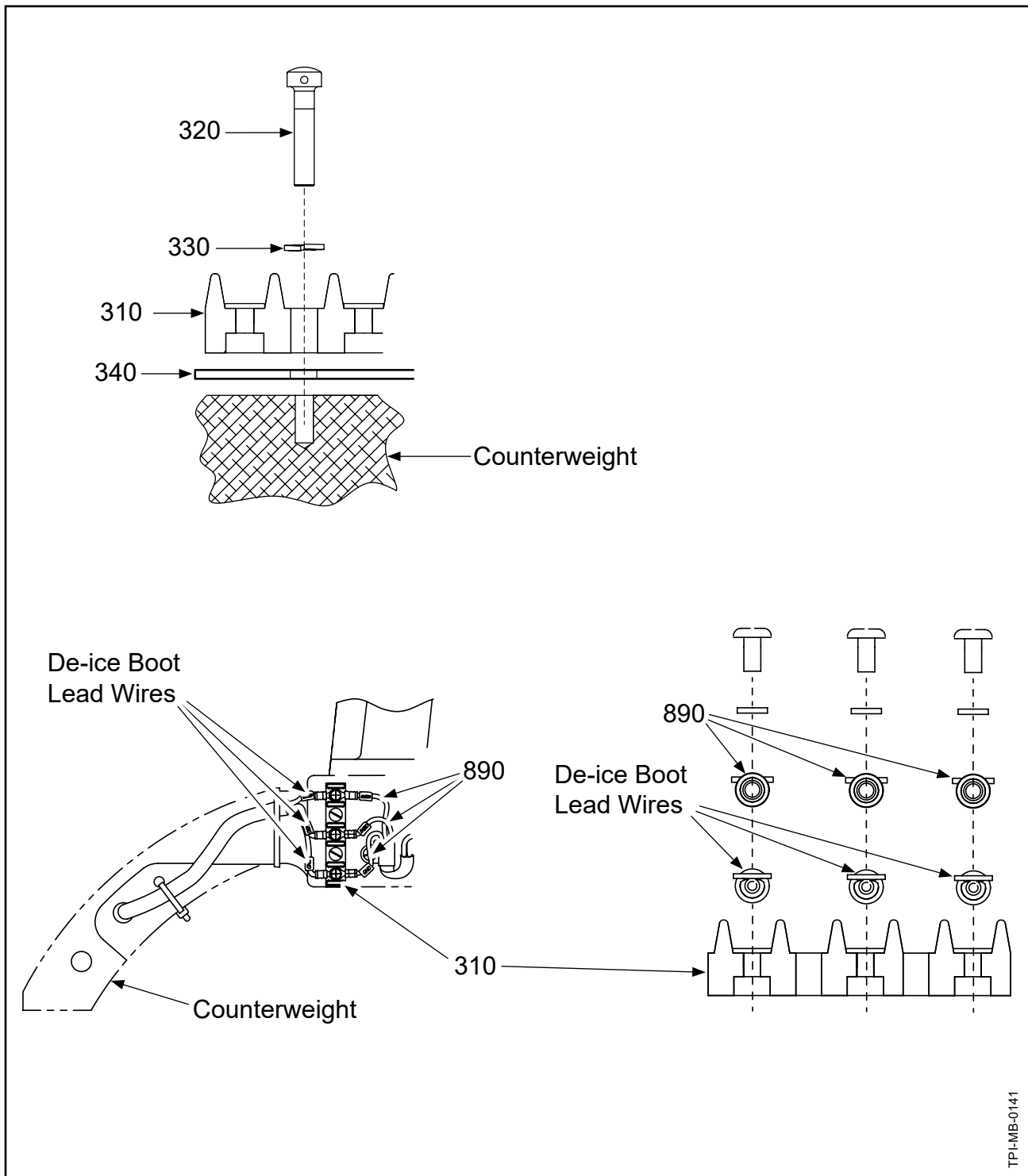
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**Terminal Strip: Bulkhead Mounted  
Figure CM-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**104264**



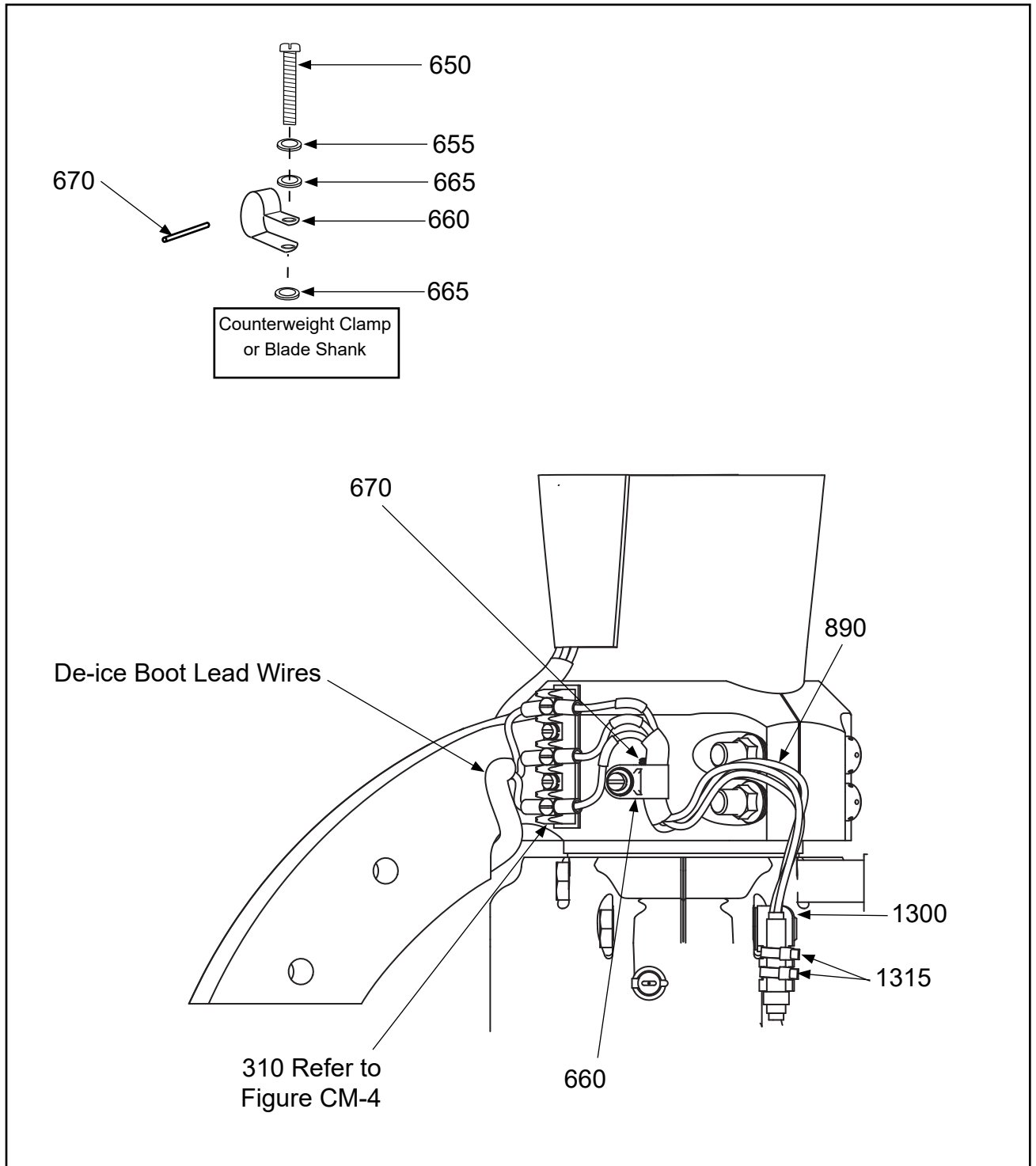
**Terminal Strip: Counterweight Mounted  
Figure CM-4**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**104264**

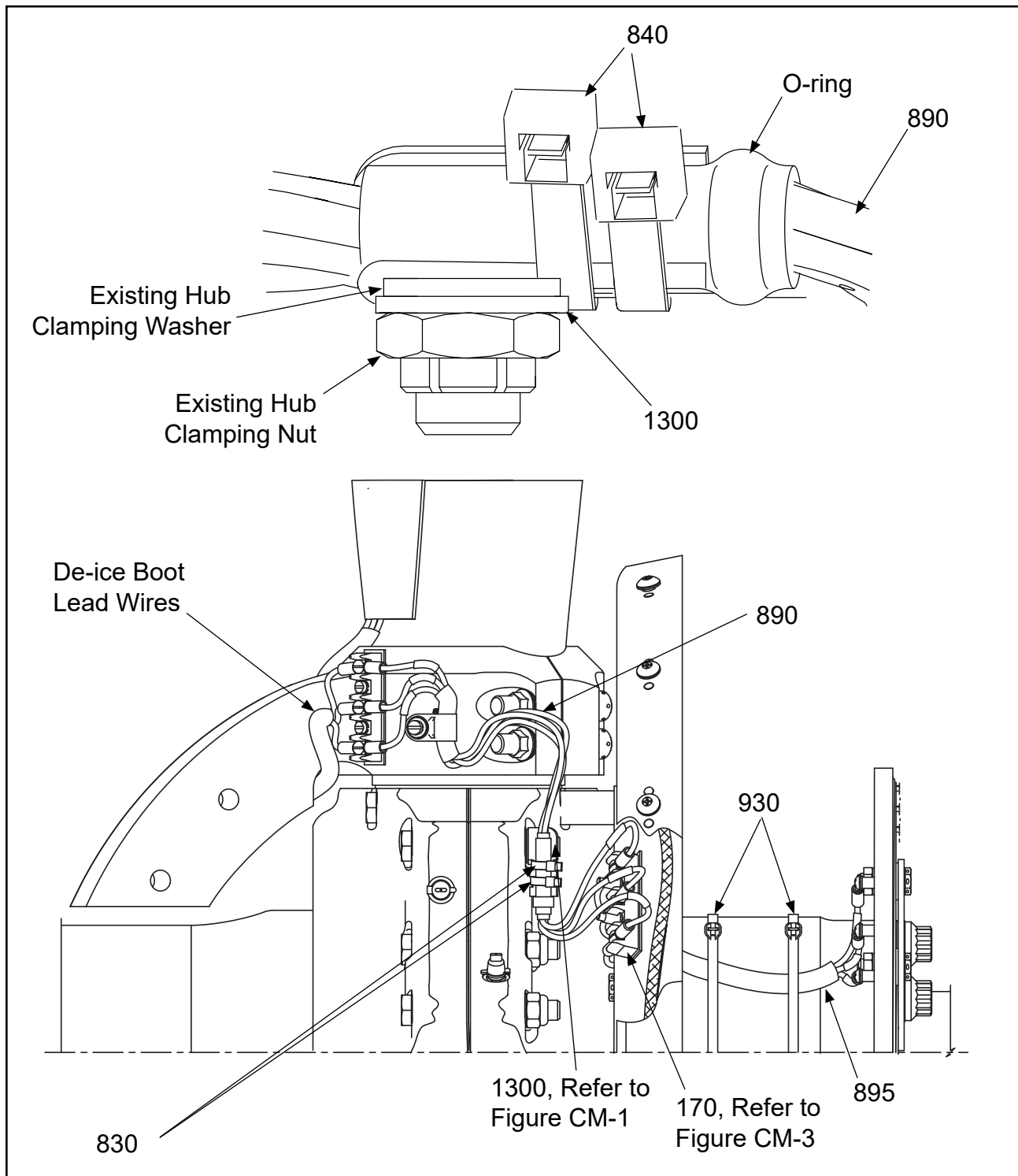


**Loop Clamp: Counterweight/Blade Shank Mounted  
Figure CM-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**104264**



**Wire Harness Bracket  
Figure CM-6**

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**104264**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>104264</b>	<b>PROPELLER DE-ICE KIT INSTALLATION INSTRUCTION 11CM FIGURES: CM-1 thru CM-6</b>		
170	1H1150-2	• TERMINAL STRIP	3	
190	2H1365	• TAPPED EYELET	6	Y
200	B-3854-41	• WASHER, LOCK	9	Y
220	B-6637-34	• SCREW, 6-32, FILLISTER HEAD, CRES	6	Y
240	2H1852-2	• TERMINAL STRIP SPACER	3	
310	1H1150-2	• TERMINAL STRIP	3	
320	B-6631-231	• SCREW, 6-32, FILLISTER HEAD, CRES	6	Y
330	B-3854-41	• WASHER, LOCK	9	Y
340	2H1852-2	• TERMINAL STRIP SPACER	3	
645	B-3855-31	• DELETED	-	
650	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	3	Y
655	B-3854-42	• WASHER, LOCK	3	Y
660	B-3853-F5	• CLAMP, LOOP, PLASTIC	3	Y
665	B-3837-N832	• WASHER, CORROSION RESISTANT	6	Y
670	B-6583-0437	• SPRING PIN, 3/32	3	Y
840	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	6	Y
890	3H2526-2	• WIRE HARNESS	3	Y
895	3H1452	• WIRE HARNESS, SLIP RING	3	Y
930	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	2	Y
1300	B-6265	• BRACKET, WIRE HARNESS	3	
1305	B-3834-0632	• WASHER	6	Y
1830	B-3599	• NUT, 3/8-24, HEX, SELF-LOCKING	3	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 104264**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**104264**

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This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**104334-1**

**CN. Installation Instruction 11CN**

- (1) Using the bolts (1170 and 1155), Belleville spring washers (1180), washers (1200), and nuts (1190), attach the slip ring (1140) to the spinner split mounting plate as shown in Figure CN-1.
- (2) Torque the nuts (1190) to 40-120 in. lb. (4.5-13.5 N•m).
- (3) Perform slip ring run-out check in accordance with the Check chapter of this manual.
- (4) Position the propeller blades at reverse blade angle.
- (5) Assemble the plug connection between the wire harness (890) and the de-ice boot.
- (6) Install the tie strap (910) around the wire harness/de-ice boot plug connection.
- (7) Position the tie strap (910) head as shown in Figure CN-2.
- (8) Do not tighten the tie strap (910) at this time.
- (9) Install two tie straps (930) under the tie strap (910), over the plug connection, and around the clamp as shown in Figure CN-2.
- (10) Do not tighten the tie straps (930) at this time.
- (11) Route the wire harness (890) lead wires over the inboard tie strap (930) and under the outboard tie strap (930).
- (12) Position the plug connection on the clamp as shown in Figure CN-2.
- (13) Using tie strap (910), secure the plug connection to the outboard tie strap (930).
- (14) Do not tighten the tie strap (910) at this time.
- (15) Using tie strap (910), secure the wire harness (890) to the outboard tie strap (930). The centerline of the tie strap (910) must be positioned over the wire harness (890) to meet the dimensional specifications shown in Figure CN-2.
- (16) Do not tighten the tie strap (910) at this time.
- (17) Make sure that the inboard tie strap (930) is positioned outboard of the lubrication fitting as shown in Figure CN-2.
- (18) Tighten the all of the tie straps (910 and 930).
- (19) Using tie strap (930), secure the de-ice boot lead wires to the blade as shown in Figure CN-2.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**104334-1**

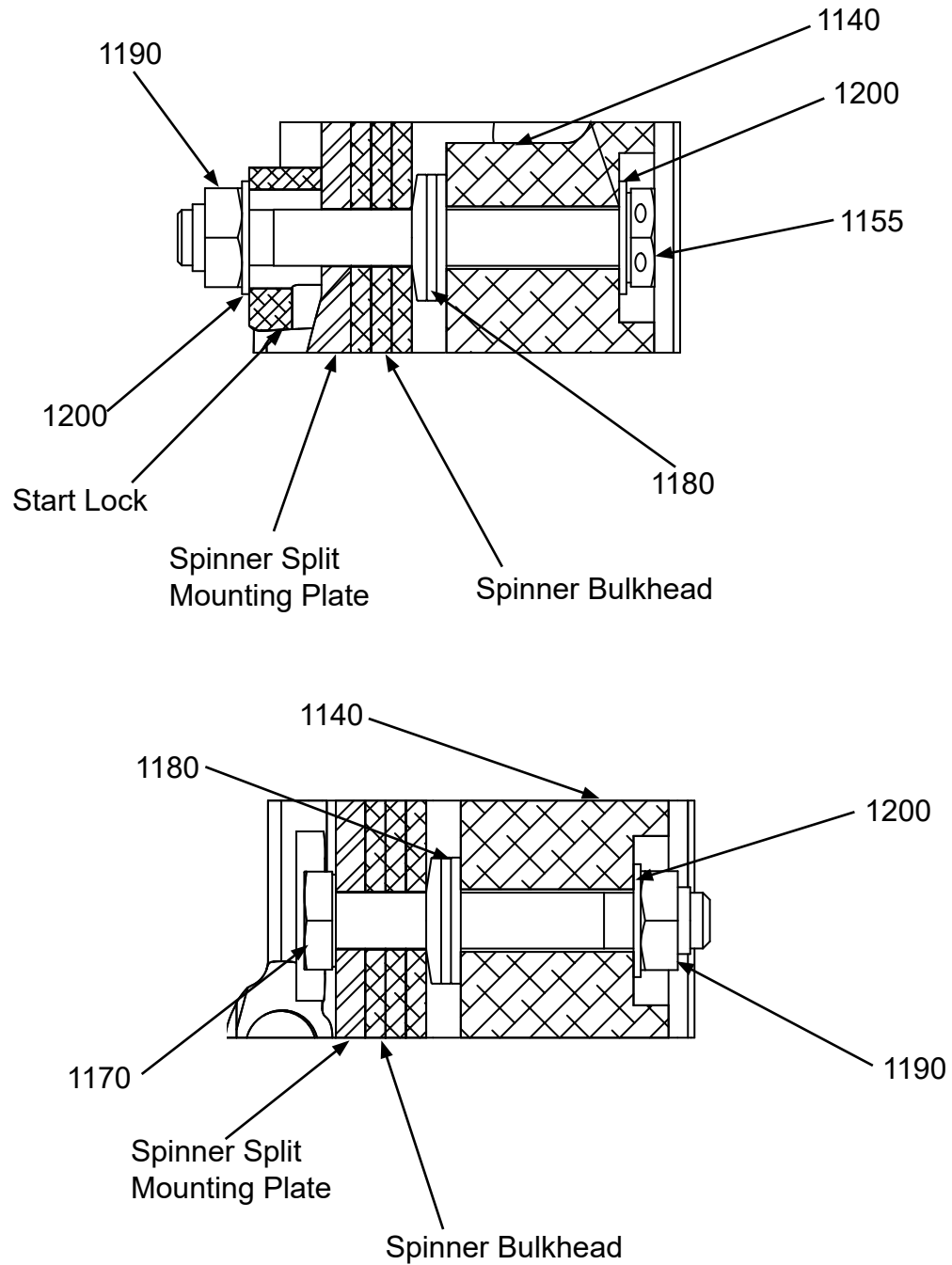
CN. Installation Instruction 11CN - continued

- (20) Using screws (220) and washers (200) attach the terminal strip (170) to the bulkhead as shown in Figure CN-3.
- (21) Torque the screws (220) to 10-12 in. lb. (1.12-1.35 N•m).
- (22) Install the slip ring lead wires and de-ice wire harness (890) to the terminal strip (170) in accordance with Figure CN-3.
- (23) Tighten the terminal screws until snug.
- (24) Install the clamp (590) around the wire harness (890) as shown in Figure CN-3.
- (25) Using screw (610), washer (630), and nut (600) install the clamp (590) to the bulkhead as shown in Figure CN-4.
- (26) Orient the centerline of the clamp (590) with the terminal screw on the terminal strip (170) as shown in Figure CN-4.
- (27) Torque the screw (610) to 22-25 in. lbs. (2.48-2.82 N•m).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**104334-1**

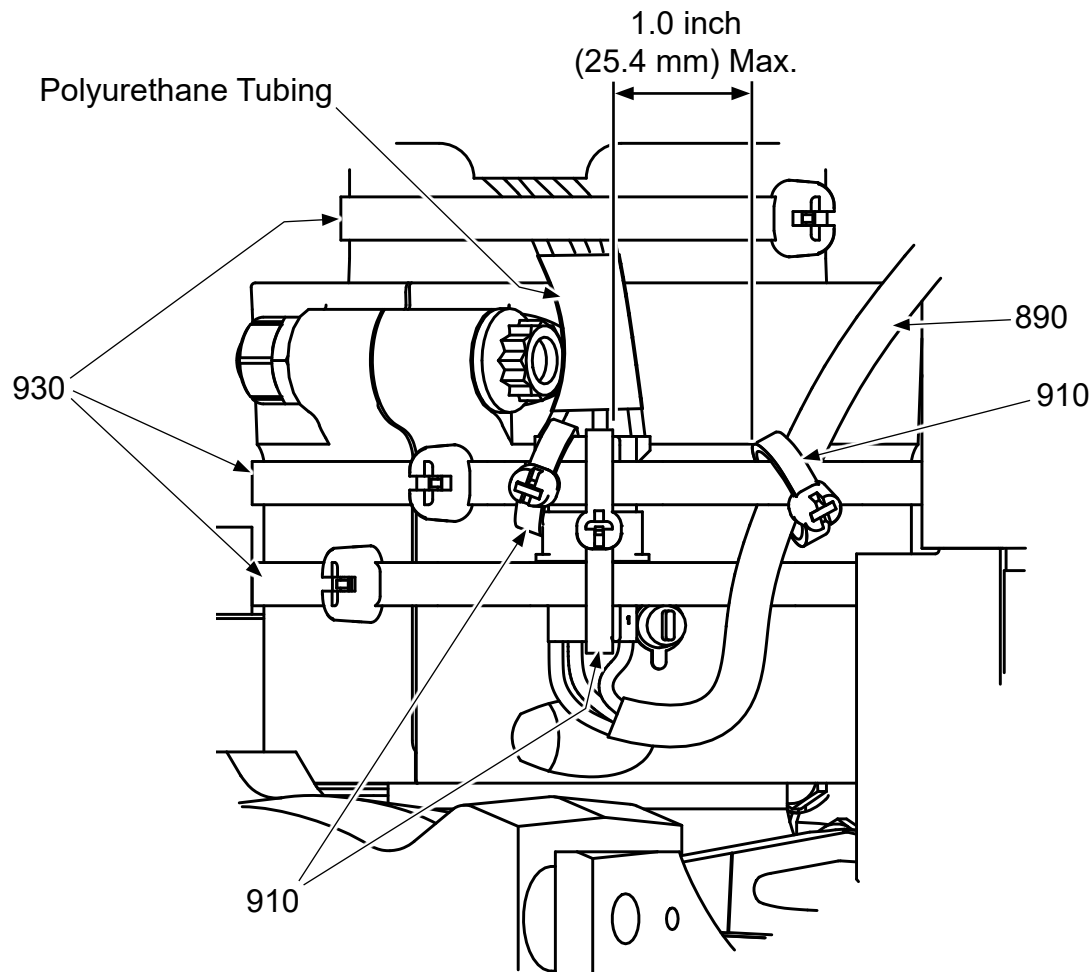


**Slip Ring Mounting  
Figure CN-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**104334-1**



TP-LMB-0467

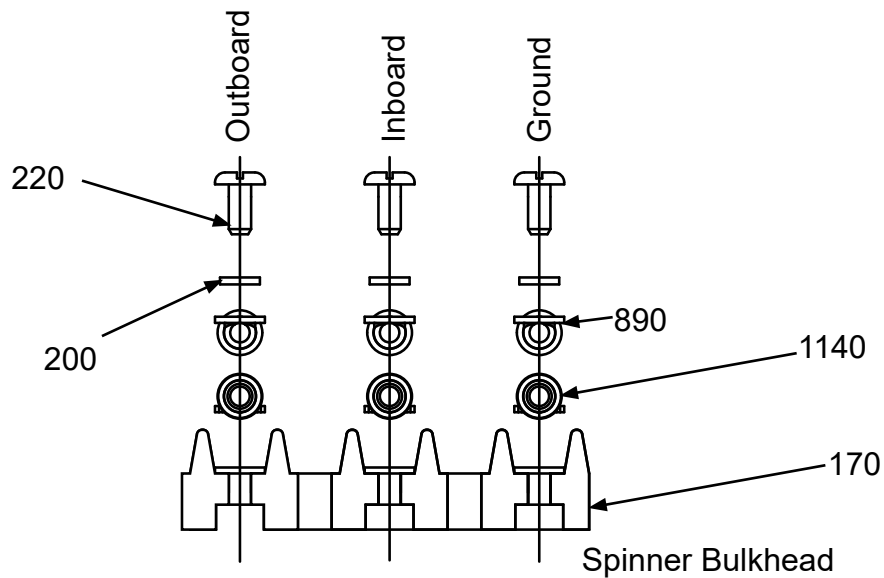
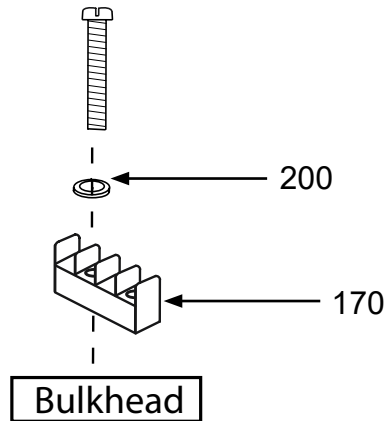
**Wire Harness and Tie Straps  
Figure CN-2**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions for the following electric de-ice kit(s):

**104334-1**



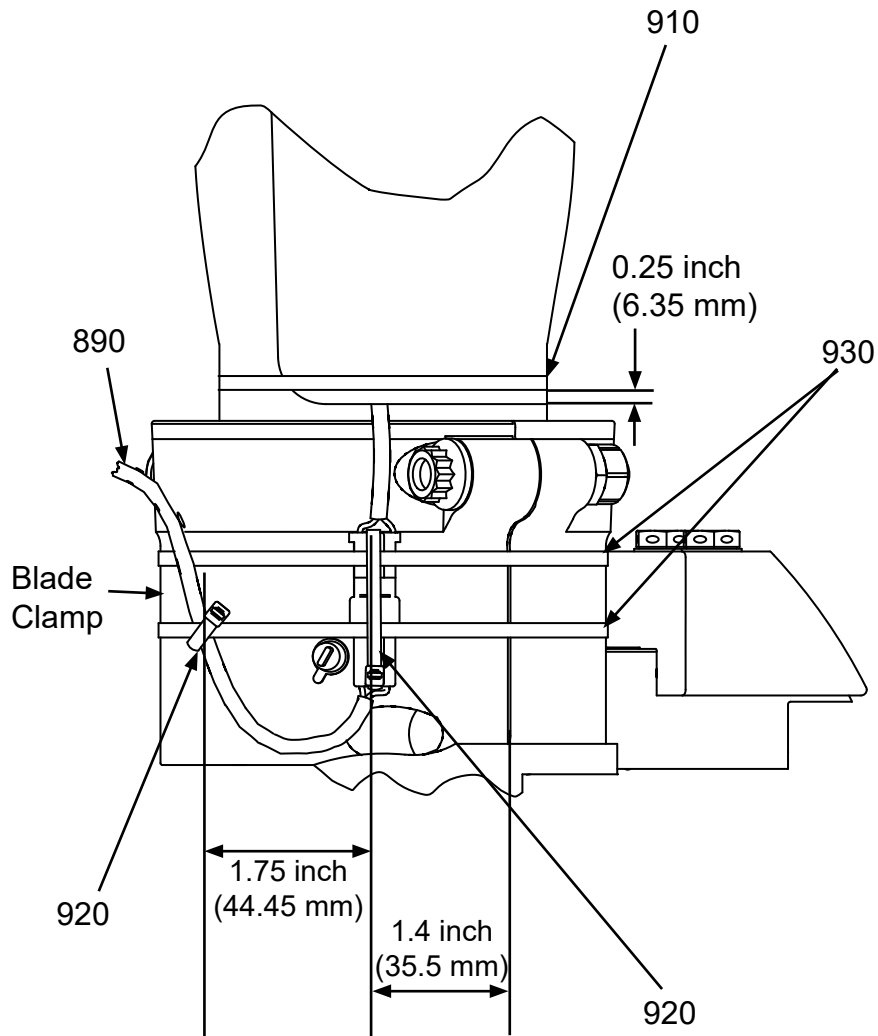
**Typical Three Wire Configuration**

**Terminal Strip  
Figure CN-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

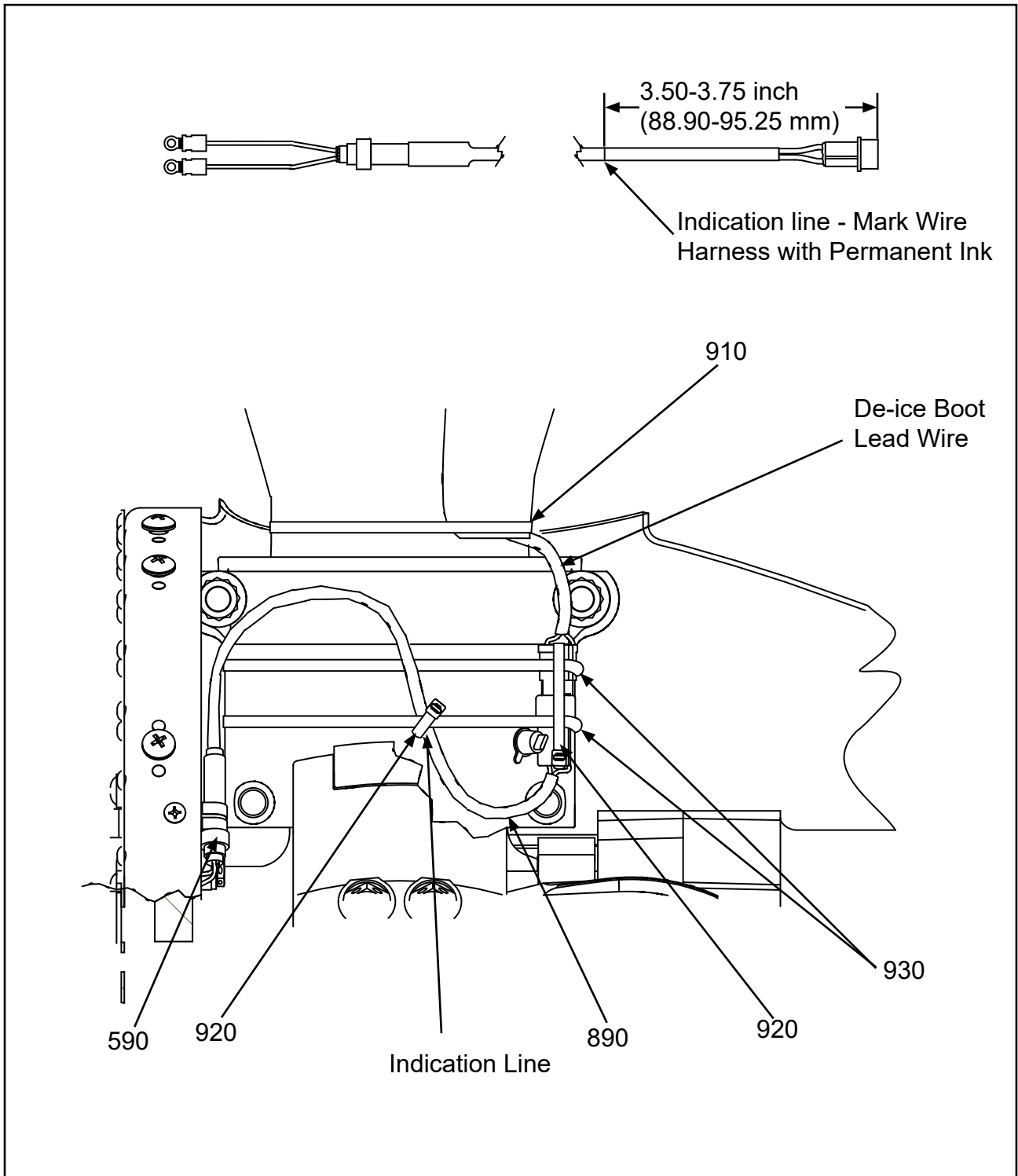
**104334-1**



**Wire Harness and Tie Strap to Clamp  
Figure CN-3, page 1 of 2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**104334-1**

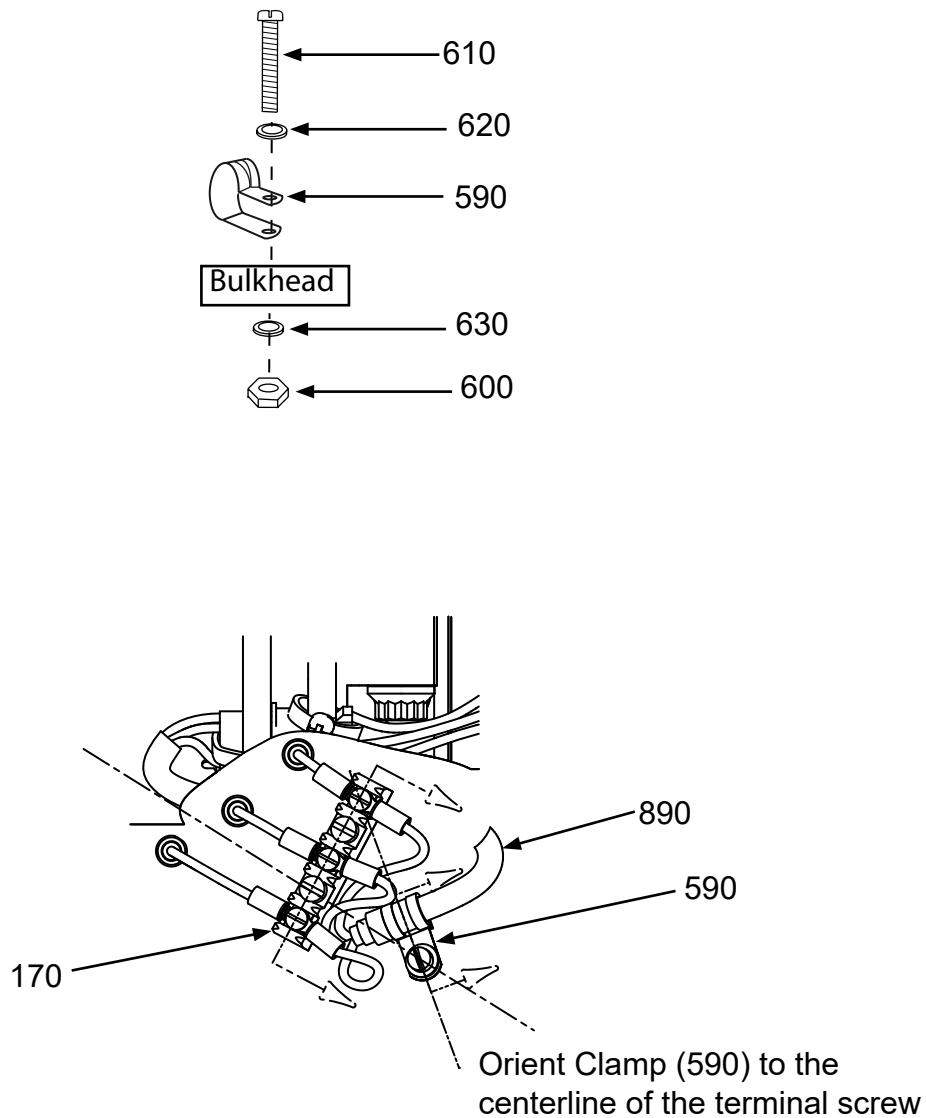


**Wire Harness and Tie Strap to Clamp**  
**Figure CN-3, page 2 of 2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**104334-1**



**Loop Clamp Installation on the Bulkhead  
Figure CN-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**104334-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>104334-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11CN</b> <b>FIGURES: CN-1 thru CN-4</b>		
170	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM	4	
200	B-3854-41	• WASHER, LOCK	8	Y
220	B-6631-233	• SCREW, 6-32, FILLISTER HEAD, CRES	8	Y
590	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	4	Y
600	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
610	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
630	B-3837-N832	• WASHER, CORROSION RESISTANT	8	Y
890	104335	• WIRE HARNESS	4	Y
890A	4H2369-1	• WIRE HARNESS, ALTERNATE	4	Y
910	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	12	Y
930	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	12	Y
1140	4H1964-4	• SLIP RING ASSEMBLY	1	
1155	B-3384-25H	• BOLT, 1/4-28, HEX HEAD	8	Y
1170	102831	• BOLT, 1/4-28, HEX HEAD	4	Y
1180	B-7076-42	• BELLEVILLE SPRING WASHER	36	Y
1190	B-3808-4	• NUT, HEX, SELF-LOCKING	12	Y
1200	B-3837-0432	• WASHER, CORROSION RESISTANT	20	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 104334-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**104334-1**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**104522 - For Cessna (T)182(S,T) Only**

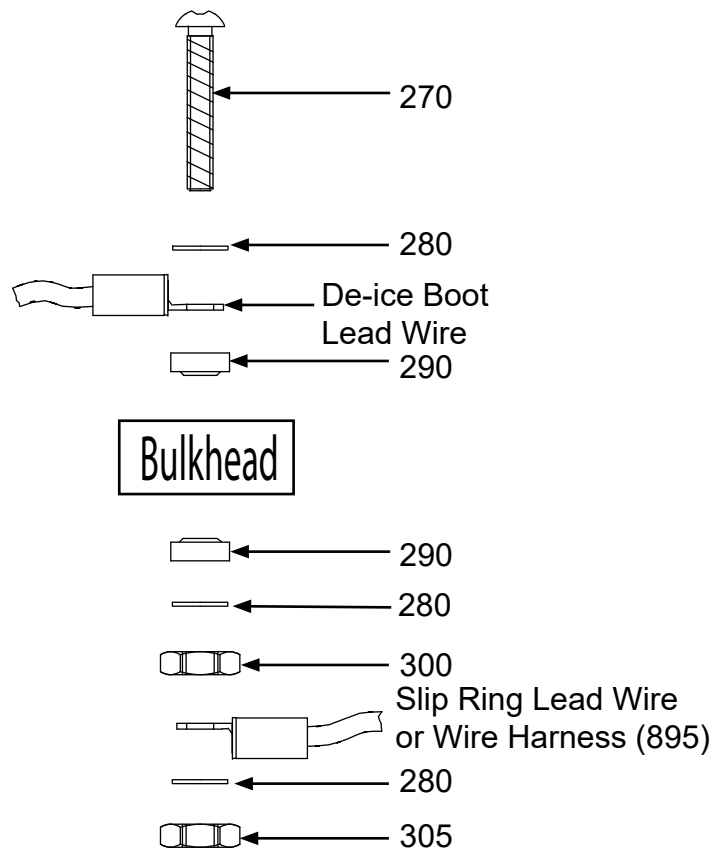
CO. Installation Instruction 11CO

- (1) Connect the staggered leads of the slip ring wire harness (895) to the slip ring in accordance with the Aircraft Maintenance Manual.
- (2) Connect the de-ice boot lead wires and the slip ring wire harness leads that are the same length to the bulkhead in accordance with Figure CO-1 and Figure CO-2.
  - (a) Torque the nut (300) to 6-8 in. lbs. (0.6-0.9 N•m).
  - (b) Torque the nut (305) to 10-12 in. lbs. (1.1-1.3 N•m).
- (3) Use the lead clip to secure the de-ice boot lead strap to the bulkhead in accordance with Figure CO-2, Figure CO-3, and Figure CO-4.
  - (a) Tighten the nut (380) until snug.
- (4) Attach the slip ring wire harness (895) to the hub with the tie straps (1820), as shown in Figure CO-5.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**104522 - For Cessna (T)182(S,T) Only**

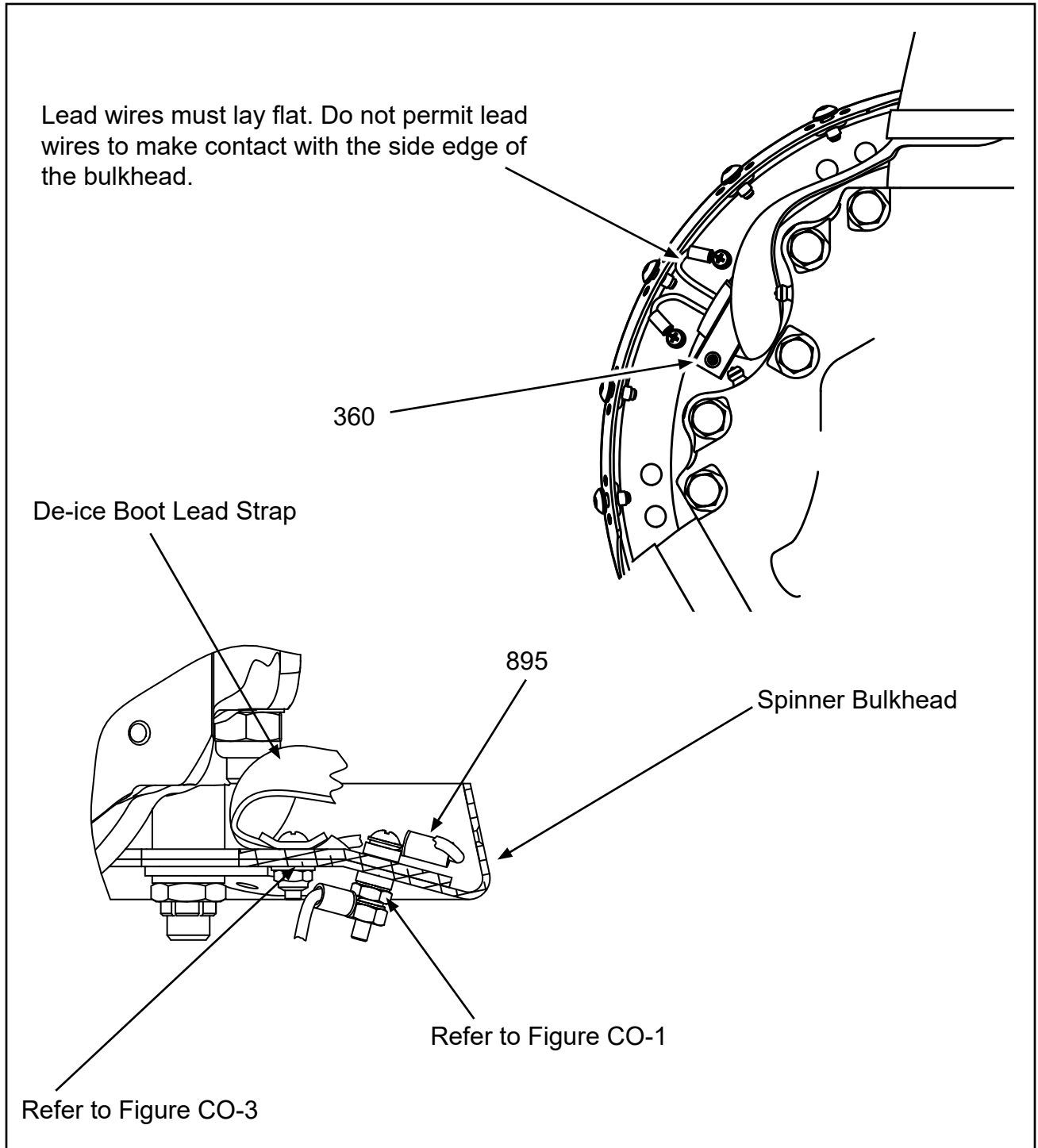


**De-ice Boot Lead Wire and Slip Ring Lead Wire or Wire Harness to Bulkhead  
Figure CO-1**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

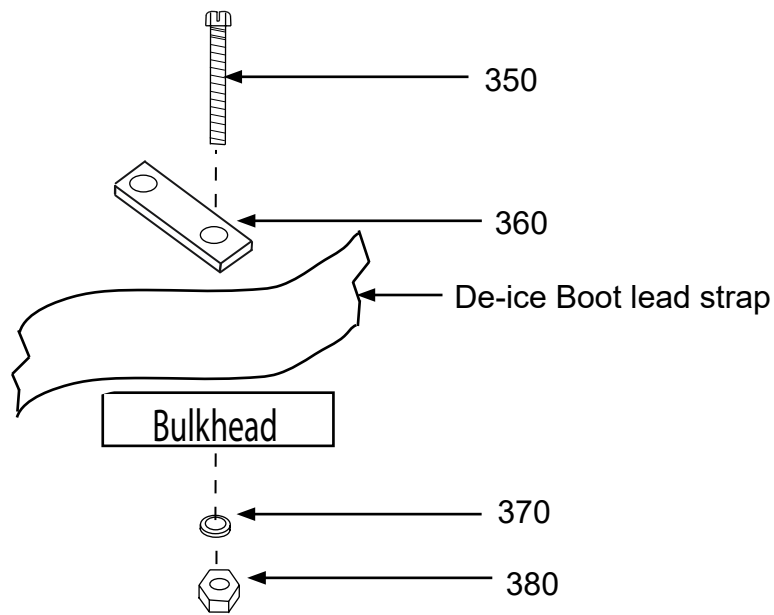
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**104522 - For Cessna (T)182(S,T) Only**



**Lead Clip and De-ice Boot Lead Strap and Lead Wire Attachment to Bulkhead  
Figure CO-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

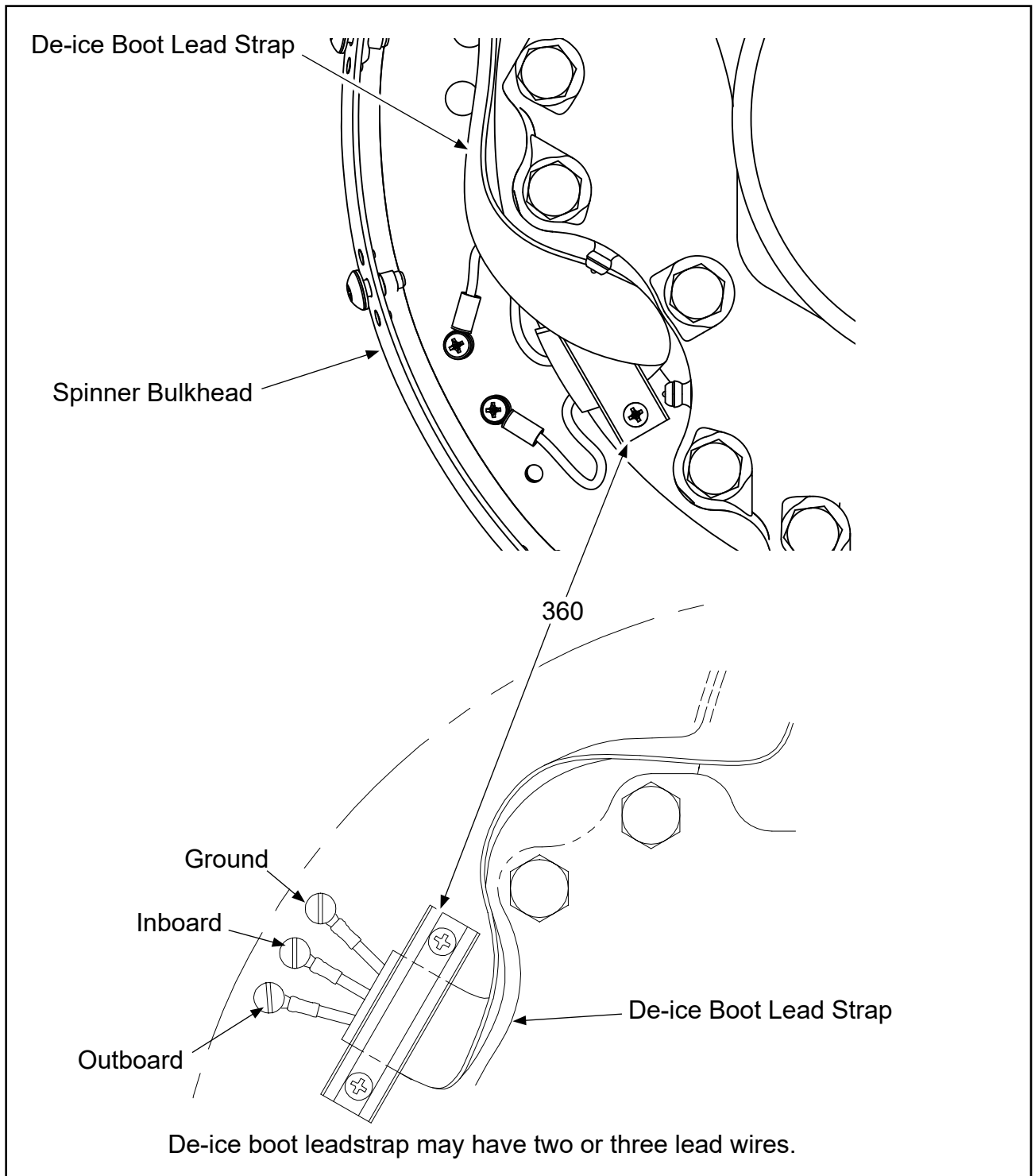
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**104522 - For Cessna (T)182(S,T) Only**



**Lead Clip Attachment to Bulkhead  
Figure CO-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**104522 - For Cessna (T)182(S,T) Only**

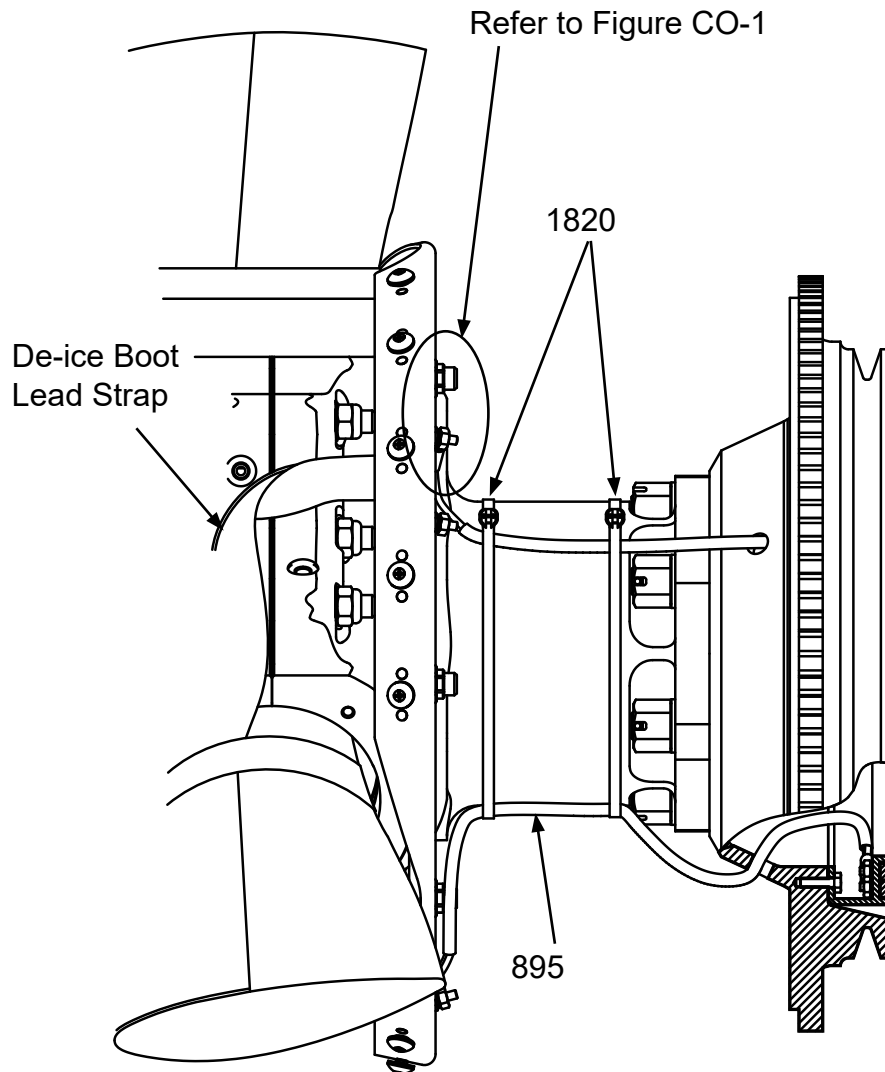


**Lead Clip and De-ice Boot Lead Strap and Lead Wires Attachment to Bulkhead  
Figure CO-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**104522 - For Cessna (T)182(S,T) Only**



**Securing Slip Ring Wire Harness to Hub  
Figure CO-5**

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**104522 - For Cessna (T)182(S,T) Only**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>104522</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) - FOR CESSNA (T)182(S,T) ONLY INSTALLATION INSTRUCTION 11CO FIGURES: CO-1 thru CO-5</b>		
270	B-7035-14	• SCREW, 6-32, PAN HEAD, BRASS	6	
280	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	18	Y
290	2H1260	• BUSHING, INSULATING	12	
300	B-6641-265	• NUT, HEX, BRASS	6	
305	102856-C06	• NUT, HEX, BRASS	6	
350	B-6637-30	• SCREW, PAN HEAD, CRES.	6	
360	3H1271-2	• CLIP, LEAD STRAP	3	
370	B-3837-N632	• WASHER, CORROSION RESISTANT	6	Y
380	B-6655-06	• NUT, HEX, SELF-LOCKING	6	Y
895	104511	• WIRE HARNESS, SLIP RING	3	Y
1820	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	2	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 104522 - For Cessna (T)182(S,T) Only**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**104522 - For Cessna (T)182(S,T) Only**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

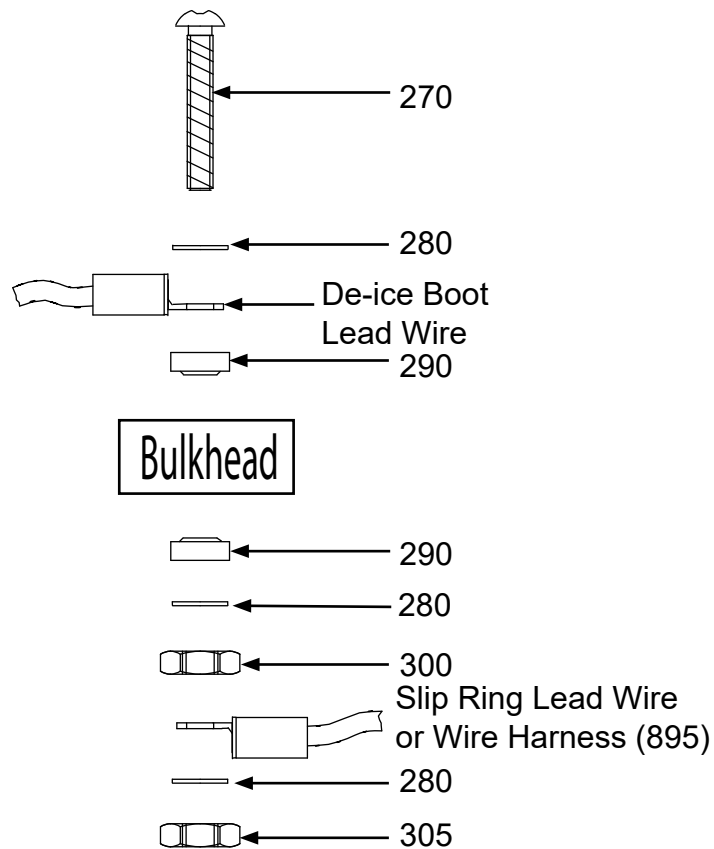
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**104522 - For Cessna T206H Only**

CP. Installation Instruction 11CP

- (1) Install one end of the slip ring wire harness (895) to the slip ring in accordance with the Aircraft Maintenance Manual.
- (2) Using screws (270), washers (280), and nuts (300 and 305), connect the de-ice boot lead wires and the slip ring wire harness lead wires to the bulkhead in accordance with Figure CP-1 and Figure CP-2.
  - (a) Torque the nut (300) to 6-8 in. lbs. (0.6-0.9 N•m).
  - (b) Torque the nut (305) to 10-12 in. lbs. (1.1-1.3 N•m).
- (3) Using screws (350), lead clip (360), washers (370), and nuts (380), secure the de-ice boot lead strap to the bulkhead in accordance with Figure CP-2 and Figure CP-3.
  - (a) Tighten the nut (380) until snug.
- (4) Attach the slip ring wire harness (895) to the hub with the tie straps (1820), as shown in Figure CP-4.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**104522 - For Cessna T206H Only**

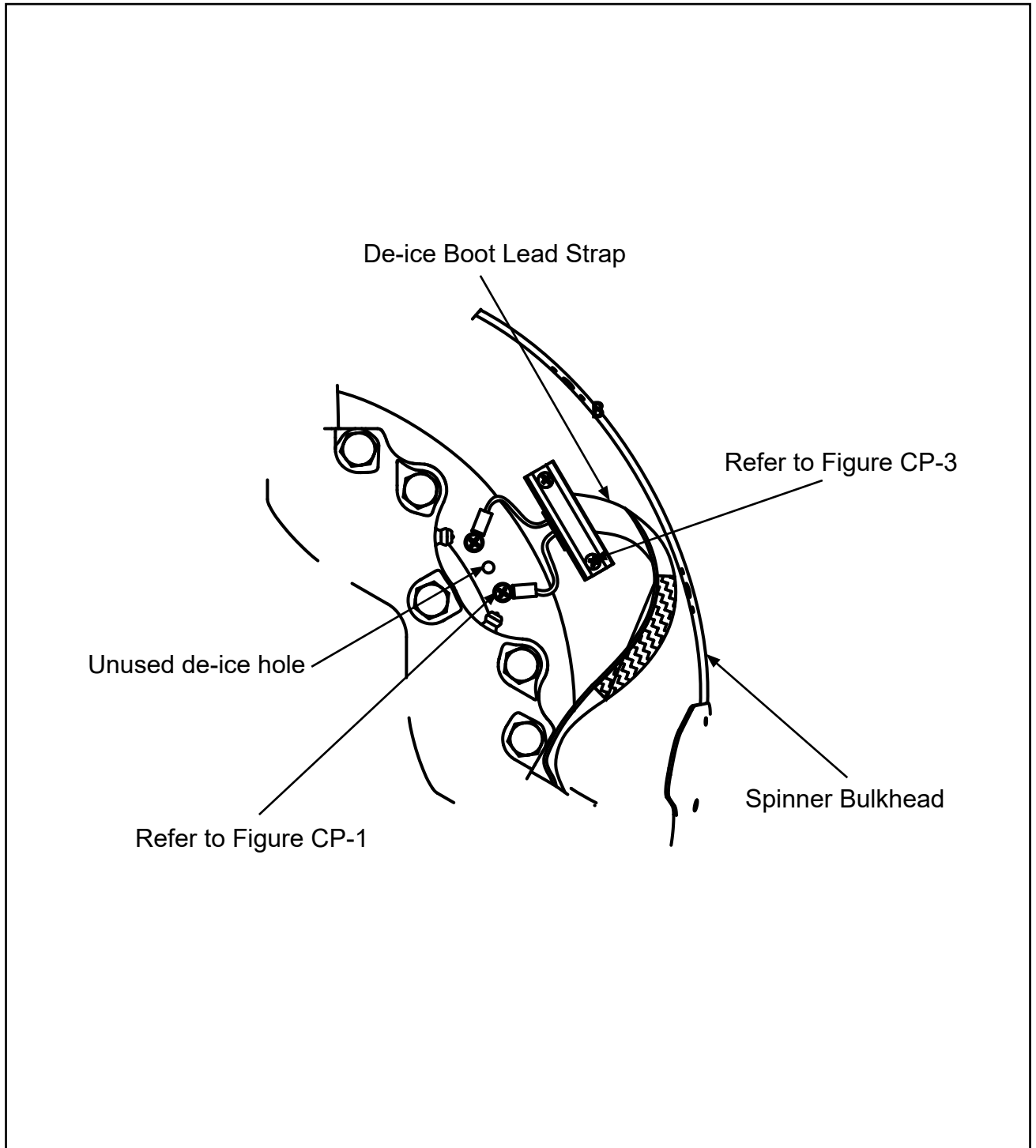


**De-ice Boot Lead Wire and Slip Ring Lead Wire or Wire Harness to Bulkhead  
Figure CP-1**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

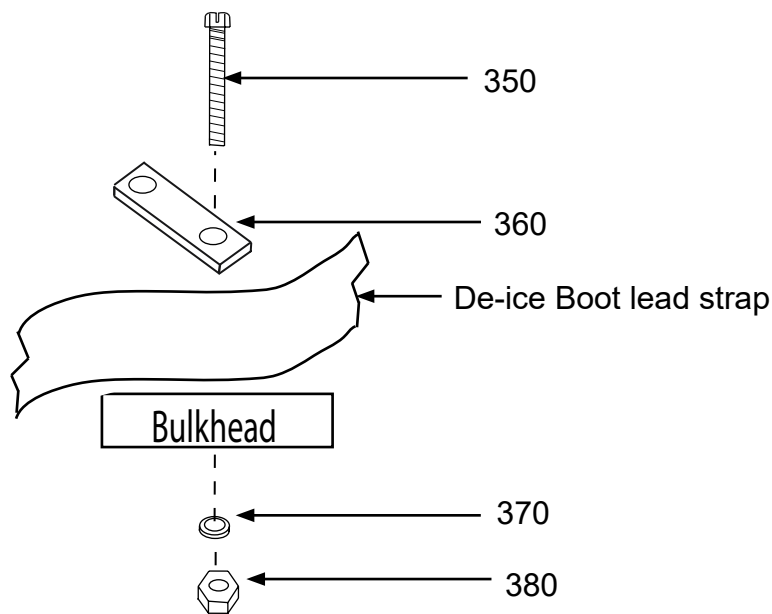
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**104522 - For Cessna T206H Only**



**Lead Clip and De-ice Boot Lead Strap and Lead Wire Attachment to Bulkhead  
Figure CP-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

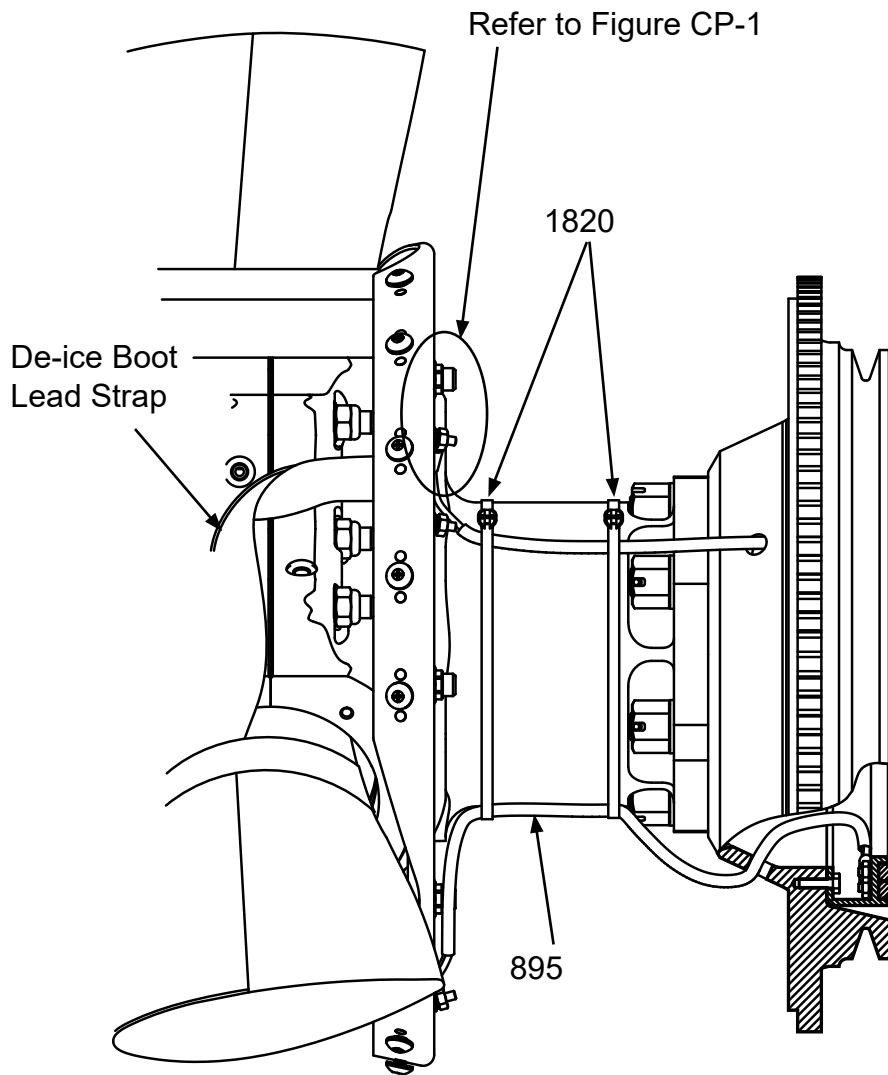
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**104522 - For Cessna T206H Only**



**Lead Clip Attachment to Bulkhead  
Figure CP-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**104522 - For Cessna T206H Only**



**Securing Slip Ring Wire Harness to Hub  
Figure CP-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**104522 - For Cessna T206H Only**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>104522</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) - FOR CESSNA T206H ONLY INSTALLATION INSTRUCTION 11CP FIGURES: CP-1 thru CP-4</b>		
270	B-7035-14	• SCREW, 6-32, PAN HEAD, BRASS	6	
280	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	18	Y
290	2H1260	• BUSHING, INSULATING	12	
300	B-6641-265	• NUT, HEX, BRASS	6	
305	102856-C06	• NUT, HEX, BRASS	6	
350	B-6637-30	• SCREW, PAN HEAD, CRES.	6	
360	3H1271-2	• CLIP, LEAD STRAP	3	
370	B-3837-N632	• WASHER, CORROSION RESISTANT	6	Y
380	B-6655-06	• NUT, HEX, SELF-LOCKING	6	Y
895	104511	• WIRE HARNESS, SLIP RING	3	Y
1820	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	2	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 104522 - For Cessna T206H Only**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**104996**

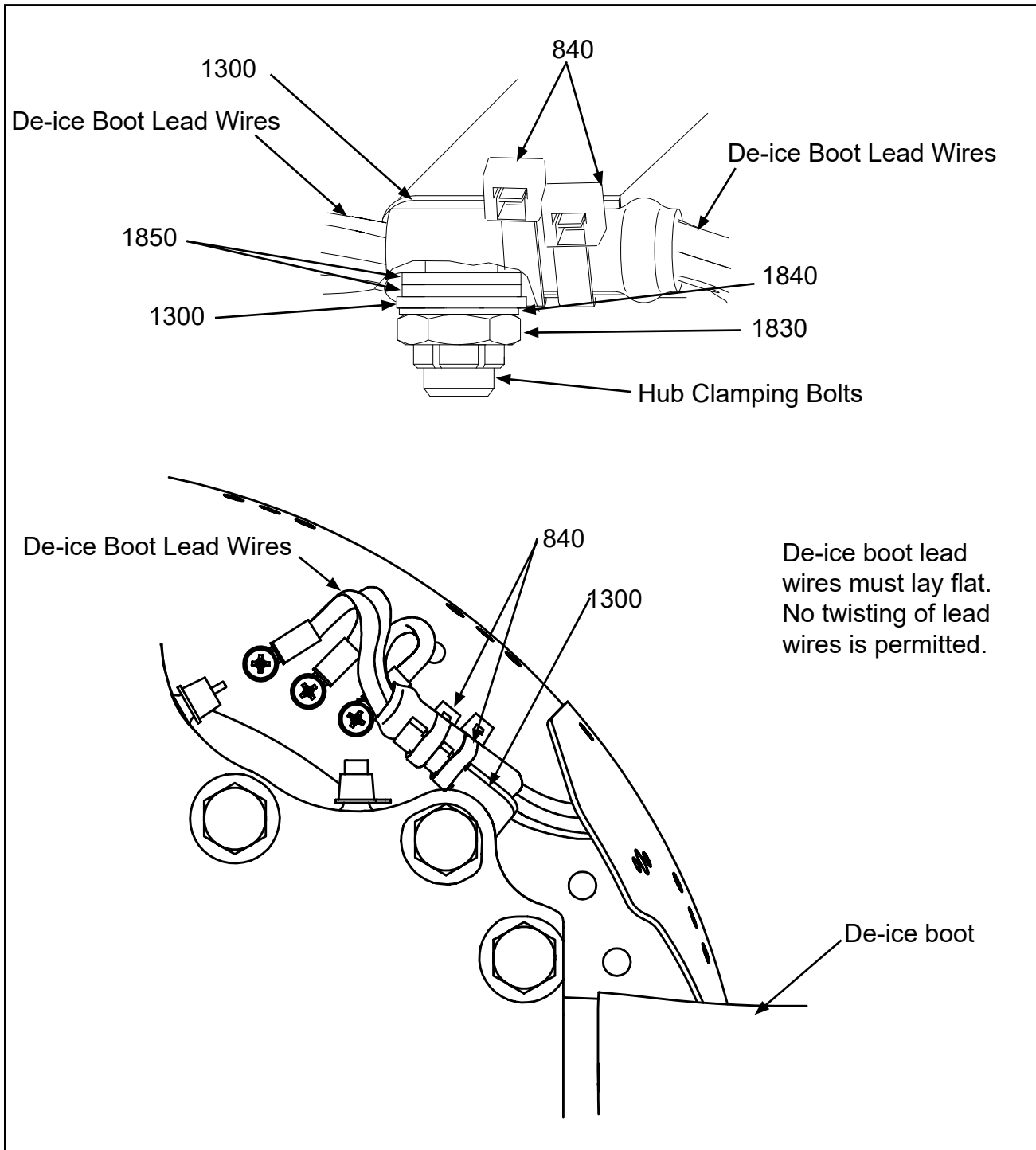
CQ. Installation Instruction 11CQ

- (1) Install the bracket (1300) under the hub clamping bolt and align as shown in Figure CQ-1.
  - (a) Torque the hub clamping nut 22-25 Ft. Lb. (29-33 N•m).
- (2) Make sure the de-ice boot lead wires lay flat against the bulkhead, as shown in Figure CQ-2. Twisting of the lead wires is not permitted.
- (3) Position the de-ice boot lead wire on the bracket (1300) and install the tie straps (840) as shown in Figure CQ-1.
- (4) Install slip ring wire harness (895) and tie straps (1820) in accordance with applicable STC instructions.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

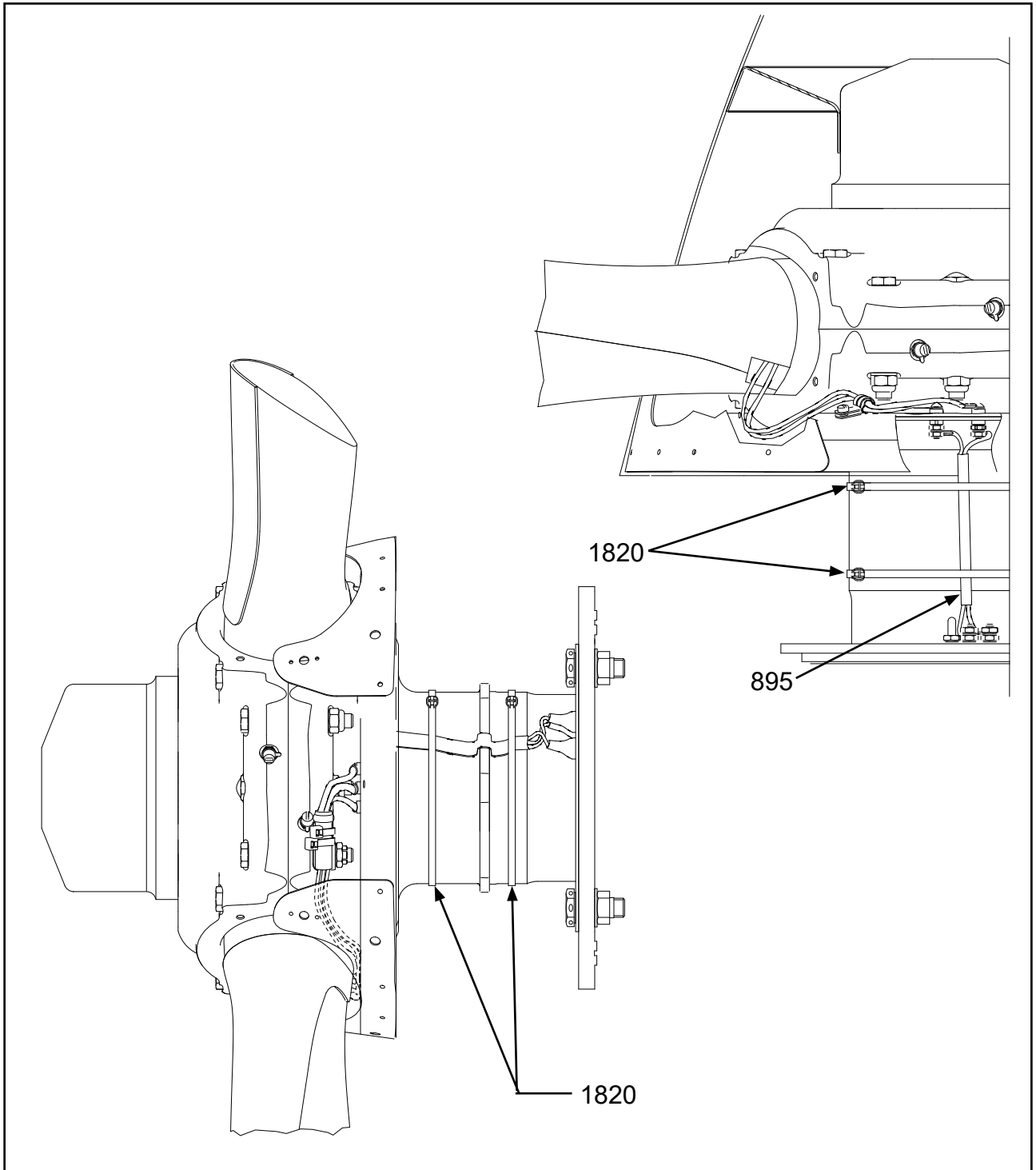
**104996**



**Securing De-ice Boot Lead Wire Bracket to Hub and  
De-ice Boot Lead Wire to Bracket  
Figure CQ-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**104996**



**Securing Slip Ring Lead Wire or Wire Harness to Hub  
Figure CQ-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**104996**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>104996</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11CQ FIGURES: CQ-1 and CQ-2</b>		
840	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	6	Y
1300	B-6265	• BRACKET, WIRE HARNESS	3	
1830	B-3599	• NUT, 3/8-24, HEX, SELF-LOCKING	3	Y
1840	B-3834-0632	• WASHER	3	Y
1850	B-3834-0663	• WASHER	6	Y
270	B-7035-14	• SCREW, 6-32, PAN HEAD, BRASS	9	
280	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	27	Y
290	2H1260	• BUSHING, INSULATING	18	
300	B-6641-265	• NUT, HEX, BRASS	9	
305	102856-C06	• NUT, HEX, BRASS	9	
895	103762	• WIRE HARNESS, SLIP RING	3	Y
975	101902	• • TERMINAL, RIING	6	
975A	7931-320619	• • AMP 320619 PIDG RING TERMINAL ALTERNATE FOR ITEM 975	6	
975B	7931-2-320619-1	• • AMP 320619 PIDG RING TERMINAL ALTERNATE FOR ITEM 975	6	
	2D1605B1W1	• • LEAD WIRE	3	
	SAE-AMS-I-7444	• • CLEAR VINYL TUBING		
1820	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	2	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 104996**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**105062**

**CR. Installation Instruction 11CR**

- (1) Using the screw (220), washers (200 and 210), and tapped eyelet (190) attach the terminal strip (170) to the bulkhead in accordance with Figure CR-1.
- (2) Torque the screw (220) to 10-12 In-Lb (1.1-1.3 N•m).
- (3) Using the screws (1170), attach the slip ring (1140) and the bulkhead to the hub as shown in Figure CR-2.
- (4) Torque each screw (1170) 96-120 In-Lb (10.1-13.5 N•m).
- (5) Complete a slip ring run-out check in accordance with the Check chapter of this manual.
- (6) Install the bracket (1300), spacer (1325), and washers (1305) on the hub clamping bolt (1315) between the hub and the nut in accordance with Figure CR-3.
- (7) Align the bracket (1300) with the terminal strip (170) as shown in Figure CR-3.
- (8) Torque the hub clamping nut to 22-25 Ft-Lb (29-33 N•m).
- (9) Position the propeller blades at reverse blade angle.
- (10) If required, press the spring pin (905) perpendicularly into the hole in the counterweight as shown in Figure CR-4.
  - (a) The spring pin (905) must extend to a height of 0.170 - 0.210 inch (4.32 - 5.33 mm).

**NOTE:** The counterweight may have been drilled for the spring pin (905) or may have an integral (cast) pin in place of the spring pin.

- (11) Assemble the plug connection between the wire harness (890) and the de-ice boot.
- (12) Install the wire harness/de-ice boot plug connections in the groove in the counterweight against the spring pin (905) as shown in Figure CR-5.
- (13) Install the tie strap (910) in the retaining groove of the counterweight and around the counterweight, and between the wires of the wire harness/de-ice boot plug connection. Refer to Figure CR-5

**CAUTION:** ROUTING THE TIE STRAP (910) INCORRECTLY CAN CAUSE AN ELECTRICAL SHORT IN THE DE-ICE SYSTEM.

- (a) Route the tie strap (910) between wires 2 and 3 on the de-ice boot lead wires.
- (b) Route the tie strap (910) between wire 1 and 2 on the wire harness lead wires.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

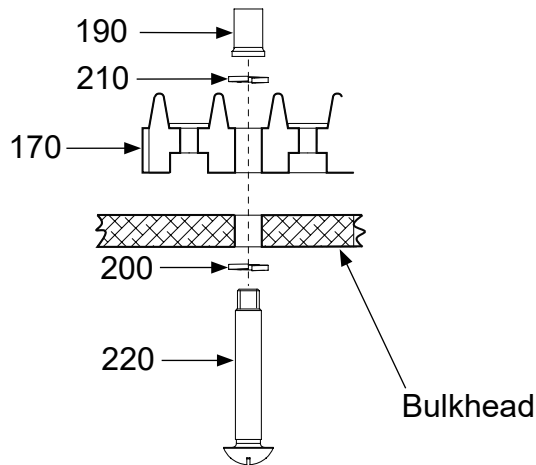
**105062**

**CR. Installation Instruction 11CR - continued**

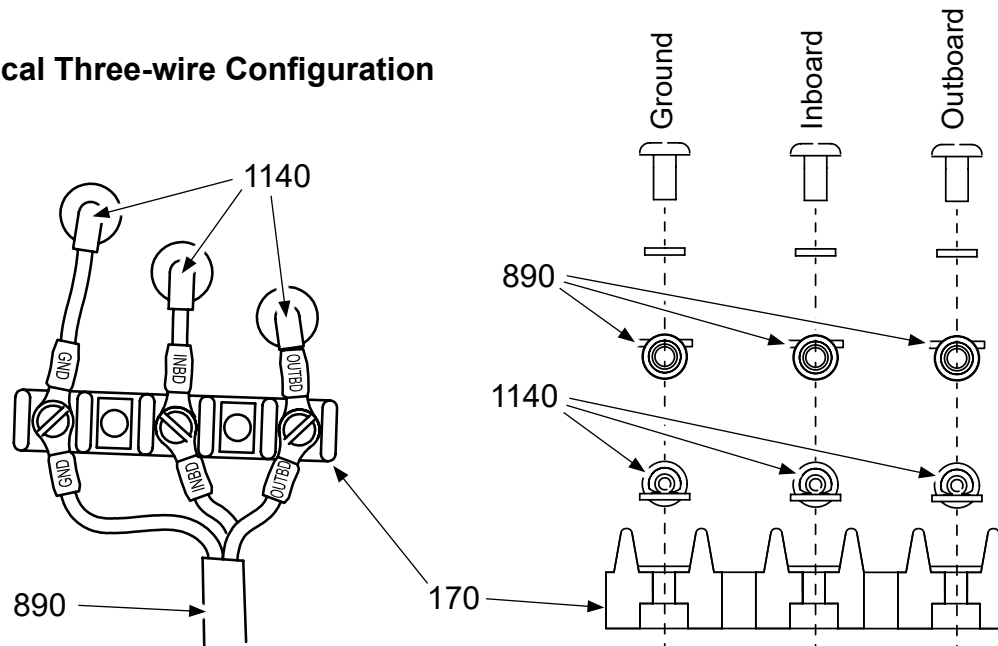
- (14) Position the head of the tie strap (910) in the approximate location shown in Figure CR-5.
- (15) Make sure the tie strap (910) is in the retaining groove of the counterweight.
- (16) Tighten the tie strap (910).
- (17) Install the tie strap (920) around the blade shank and over the de-ice boot lead wires as shown in Figure CR-6.
- (18) Locate the head of the tie strap (920) at the blade trailing edge as shown in Figure CR-6.
- (19) Tighten the tie strap (920).
- (20) Using the tie strap (930), secure the de-ice boot lead wires to the tie strap (910) as shown in Figure CR-5.
- (21) Use clean compressed air to remove unwanted material from the threaded hole in the blade shank.
- (22) Install the clamp (660) around the wire harness (890) and against the O-ring as shown in Figure CR-7.
- (24) Apply threadlocker CM399 to the threads of the screw (650).
- (25) Using the screw (650) and washers (630), install the clamp (660) to the blade shank in accordance with Figure CR-7.
- (26) Torque the screw (650) to 20-22 In-Lb (2.3-2.4 N•m).
- (27) Position the de-ice boot lead wire on the bracket (1300) with the O-ring as shown in Figure CR-3.
- (28) Install the tie straps (840). Twisting of the lead wires is not permitted.
- (29) Install the slip ring lead wires and de-ice wire harness (890) to the terminal strip (170) in accordance with Figure CR-1.
- (30) Tighten the terminal screws until snug.
- (31) Cycle the propeller from reverse angle to feather angle to make sure of proper wire harness installation. Make sure the wire harness is not blocked during cycling.

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**105062**



## Typical Three-wire Configuration



**NOTE:** The illustrations show slip ring wires on a typical right-hand (rotation) propeller.

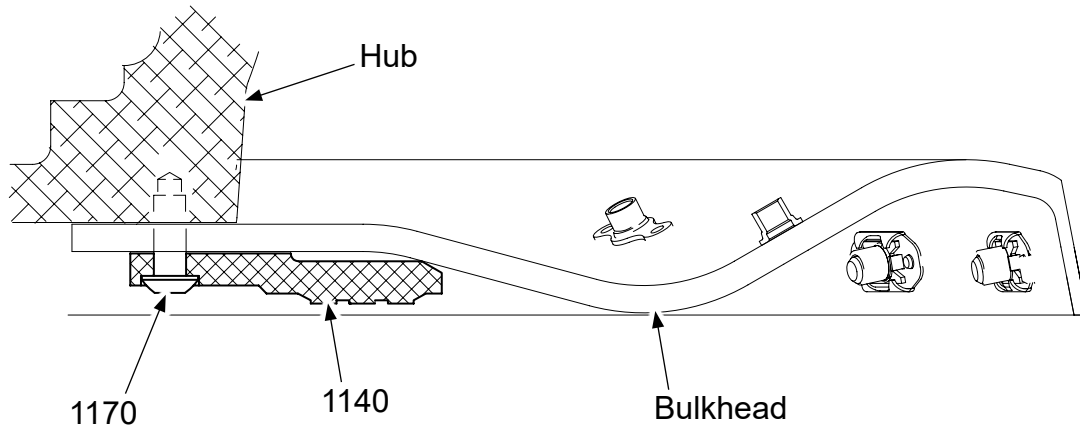
**Terminal Strip: Bulkhead Mounted  
Figure CR-1**

TPI-MB-0139

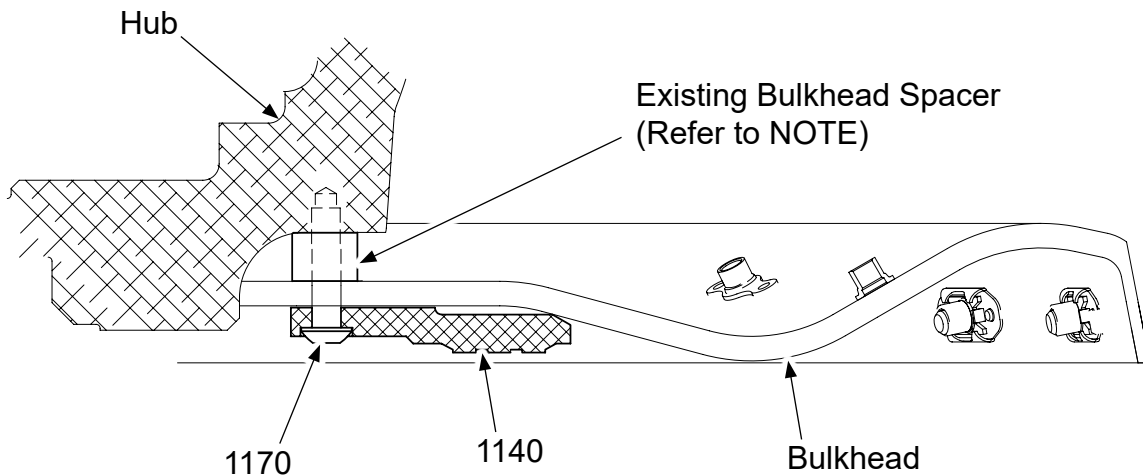
**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**105062**

**Typical Slip Ring Installation (without bulkhead spacer)**



**Typical Slip Ring Installation (with bulkhead spacer)**



**NOTE:** The bulkhead spacer is a spinner mounting component and is application specific. Refer to Hartzell Propeller Application Guide Manual 159 (61-02-59).

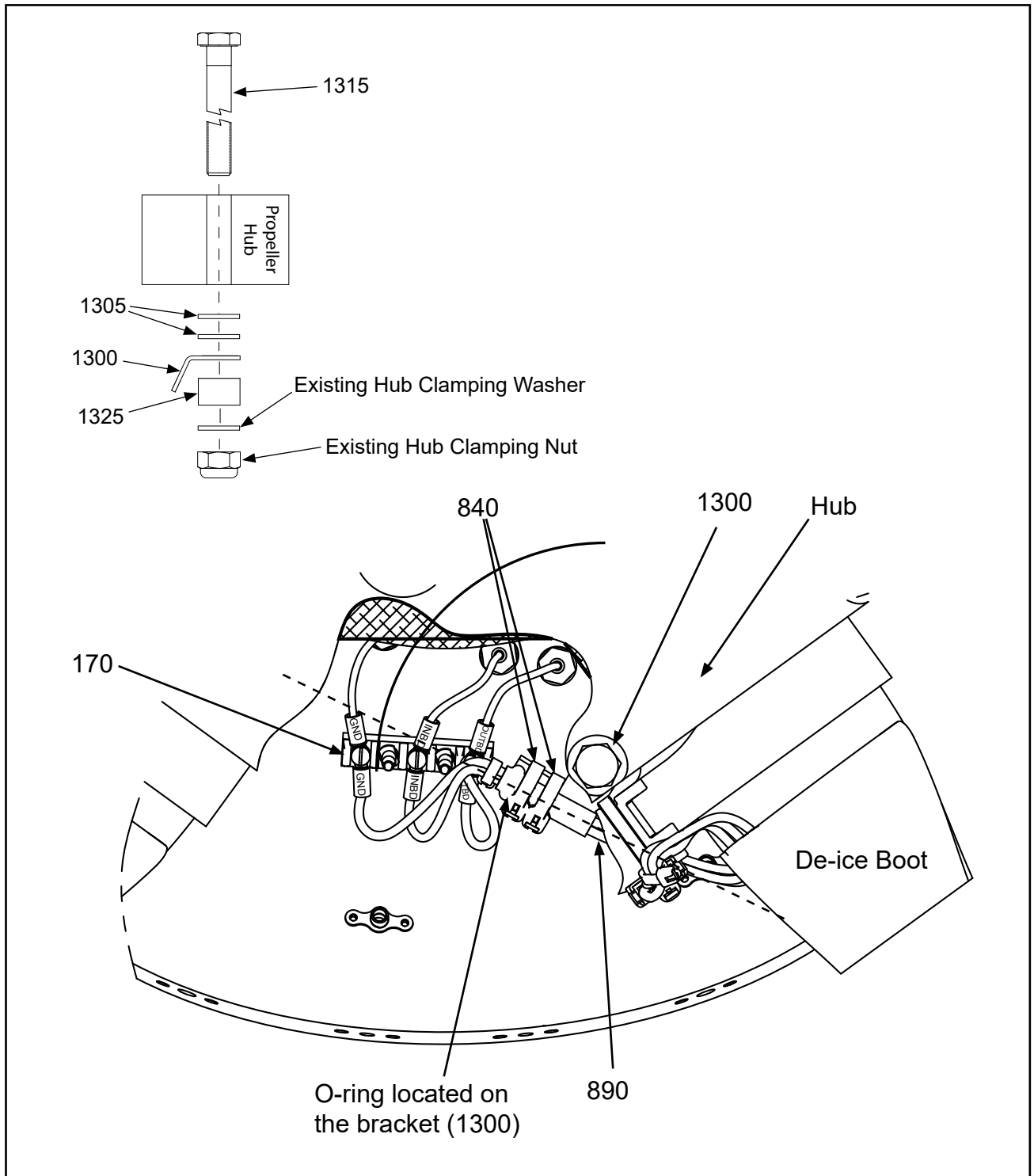
TPI-MB-0204, TPI-MB-0223

**Slip Ring Mounting  
Figure CR-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

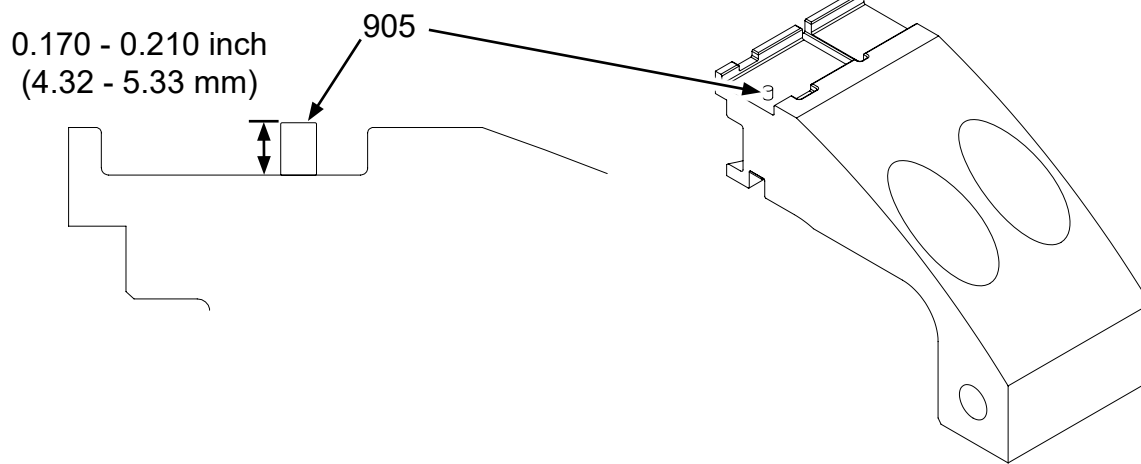
**105062**



**Wire Harness Bracket  
Figure CR-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**105062**



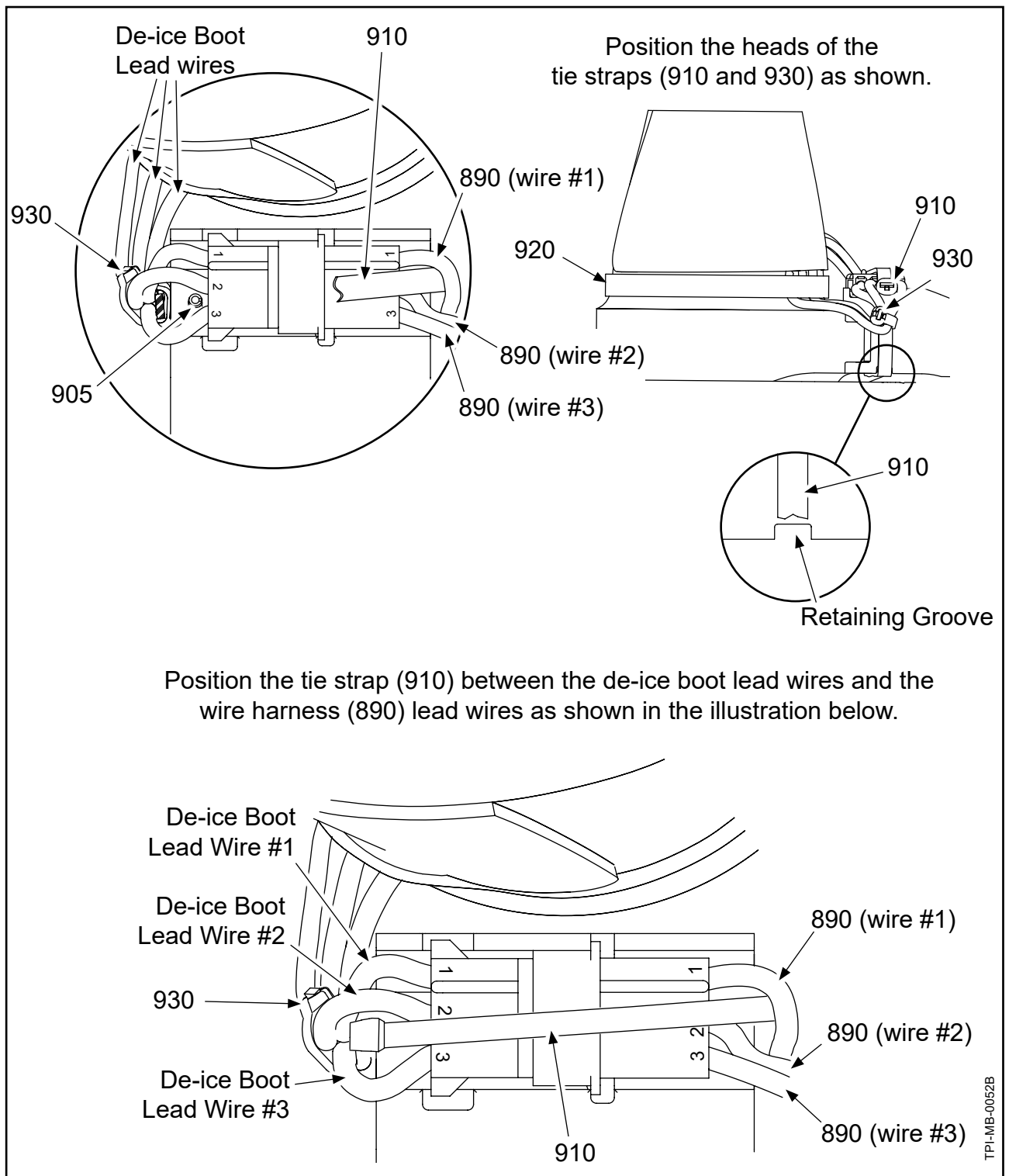
TPI-MB-0078

**Spring Pin Height  
Figure CR-4**

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

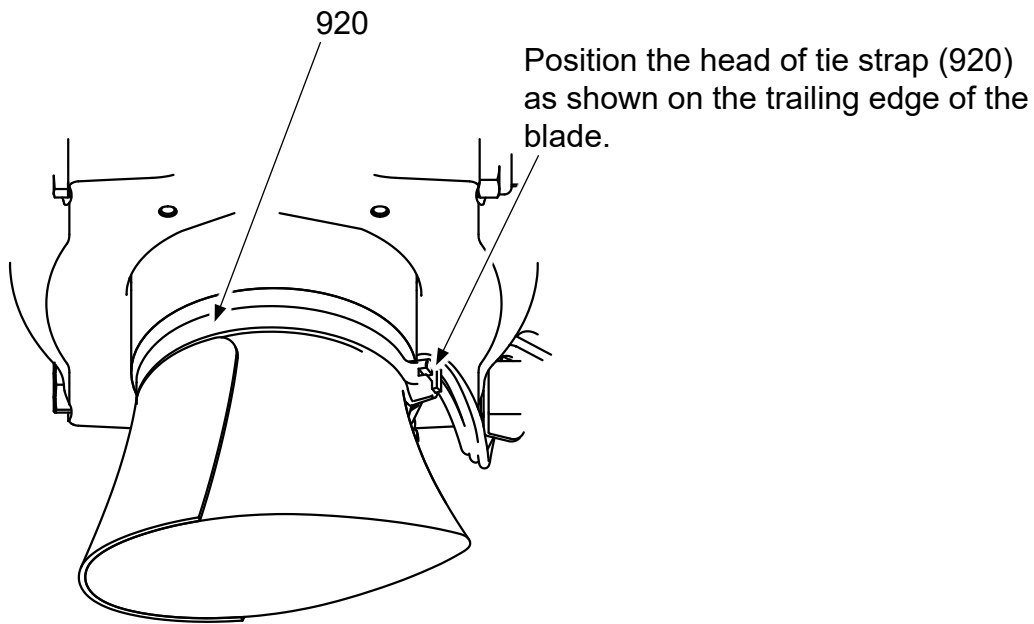
**105062**



**Wire Harness to Blade Shank/Counterweight**  
**Figure CR-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**105062**



TL-180100155

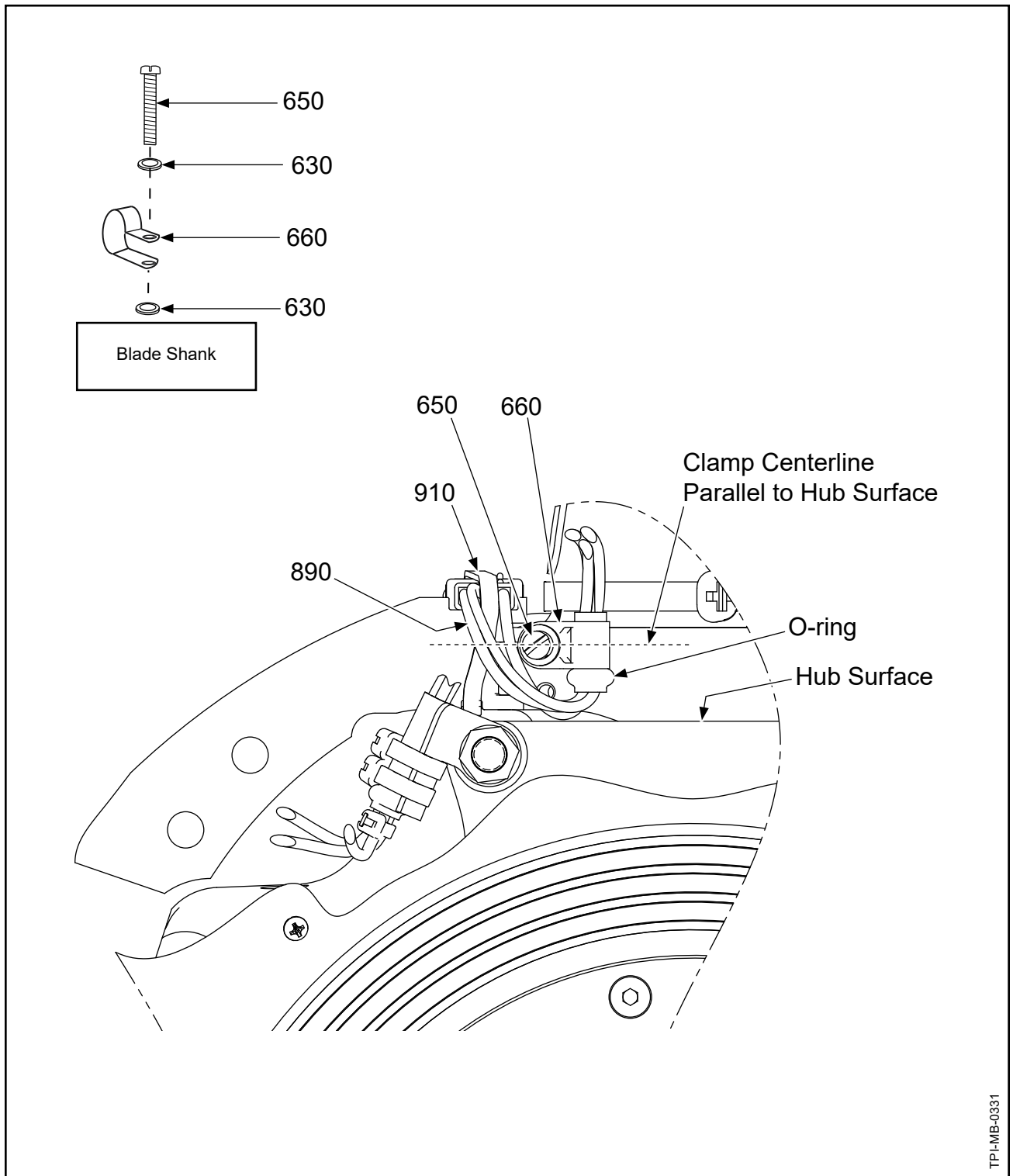
**Wire Harness to Blade Shank  
Figure CR-6**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**105062**



**Loop Clamp Orientation  
Figure CR-7**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**105062**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>105062</b>	<b>PROPELLER DE-ICE KIT INSTALLATION INSTRUCTION 11CR FIGURES: CR-1 thru CR-7</b>		
170	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM	5	
190	2H1365	• TAPPED EYELET	10	Y
200	B-3854-41	• WASHER, LOCK	10	Y
210	B-3854-41	• WASHER, LOCK	10	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	10	Y
630	B-3837-0332	• WASHER, CORROSION RESISTANT	10	Y
645	B-3855-32	• DELETED	-	
650	B-3840-7	• SCREW, 10-32, FILLISTER HEAD, CRES	5	Y
660	B-3853-F5	• CLAMP, LOOP, PLASTIC	5	Y
840	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	10	Y
890	105066	• DE-ICE WIRE HARNESS	5	Y
905	B-3842-0437	• SPRING PIN, 3/32", CRES	5	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	5	Y
920	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	5	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	5	Y
1140	105043	• SLIP RING ASSEMBLY	1	
1170	A-2070-11	• SCREW, 1/4-28, BUTTON HEAD	10	Y
1300	B-6265	• BRACKET, WIRE HARNESS	5	
1305	B-3834-0632	• WASHER	15	Y
1315	A-3219-1	• BOLT, 3/8-24, HEX HEAD	5	
1315A	107083	• BOLT, 3/8-24, HEX HEAD ALTERNATE FOR ITEM 1315, POST HC-SL-30-365	5	
1325	A-2246	• SPACER ALUMINUM	5	

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 105062**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**105339**

**CS. Installation Instruction 11CS**

- (1) Using the screws (1155 and 1170), Belleville spring washers (1180), washers (1200), and nuts (1190), attach the slip ring (1140) to the spinner split mounting plate as shown in Figure CS-1.
- (2) Torque the screws (1155 and 1170) to 96-120 in. lb. (10.1-13.5 N•m).
- (3) Perform a slip ring run-out check in accordance with the Check chapter of this manual.
- (4) Position the propeller blades at high blade angle.
- (5) Assemble the plug connection between the wire harness (890) and the de-ice boot.
- (6) Install the tie strap (920) around the wire harness/de-ice boot plug connection. Do not tighten at this time.
- (7) Secure the wire harness/de-ice boot connection to the clamp.
  - (a) Install two tie straps (930) under the tie strap (920), over the wire harness/de-ice boot plugs, and around the clamp as shown in Figure CS-2. Do not tighten at this time.
  - (b) Position the two tie straps (930) outboard of the lubrication fitting.
  - (c) Position the tie strap heads in the approximate location on the side of the clamp as shown in Figure CS-2. Do not tighten the tie straps (930) at this time.
- (8) Route the wire harness (890) over the inboard tie strap (930) and under the outboard tie strap (930) as shown in Figure CS-2.
- (9) Using a tie strap (920), secure the de-ice boot lead wire to the outboard tie strap (930) as shown in Figure CS-2. Do not tighten at this time.
- (10) The tie strap (910) around the blade shank must be located as shown in Figure CS-2. Do not tighten at this time.
- (11) Position the wire harness/de-ice boot plug connection as shown in Figure CS-2.
- (12) Tighten all the tie straps (910, 920 and 930).
- (13) Using screws (220) and washers (200) attach the terminal strip (170) to the bulkhead in accordance with Figure CS-3.
- (14) Torque the screws (220) to 10-12 in. lb. (1.12-1.35 N•m).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**105339**

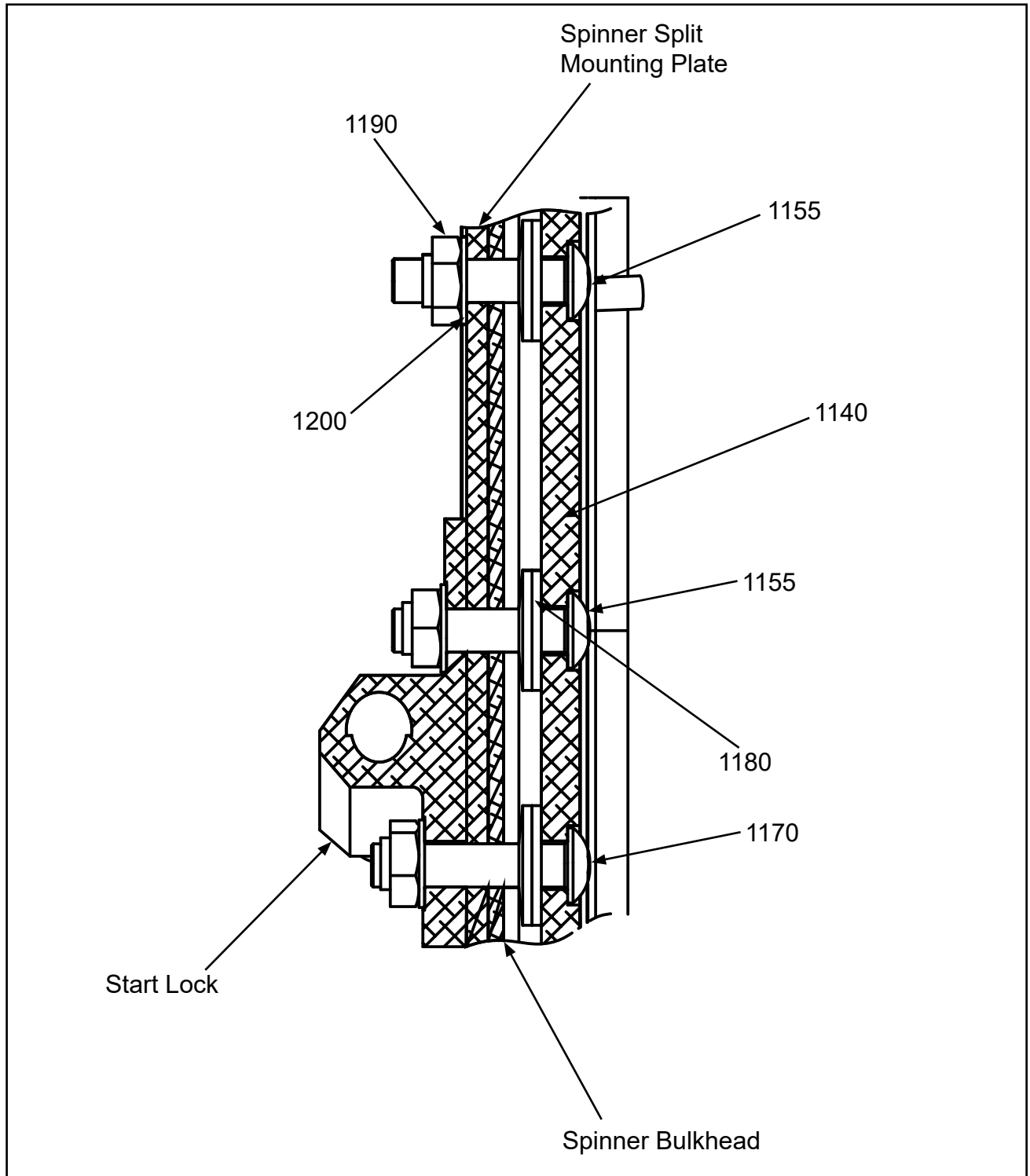
CS. Installation Instruction 11CS - continued

- (15) Install the slip ring lead wires and de-ice wire harness (890) to the terminal strip (170) in accordance with Figure CS-3.
  - (a) Tighten the terminal screws until snug.
- (16) Install the clamp (590) around the wire harness (890) as shown in Figure CS-4.
- (17) Using screws (610), washers (630), and nuts (600), install the clamp (590) to the bulkhead in accordance with Figure CS-4.
  - (a) Orient the centerline of the clamp (590) parallel to terminal strip (170).
- (18) Torque the screw (610) to 22-25 in. lbs. (2.48-2.82 N•m).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**105339**

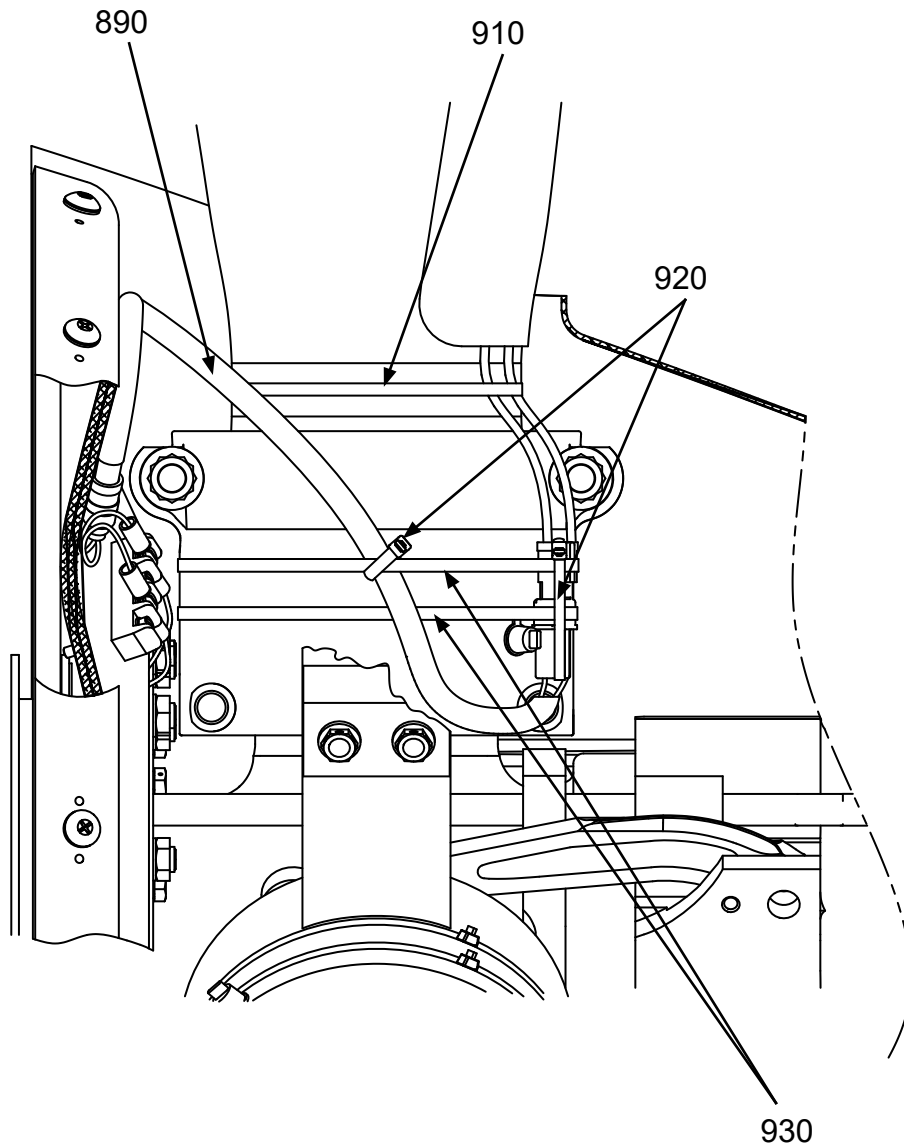


**Slip Ring Mounting  
Figure CS-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**105339**



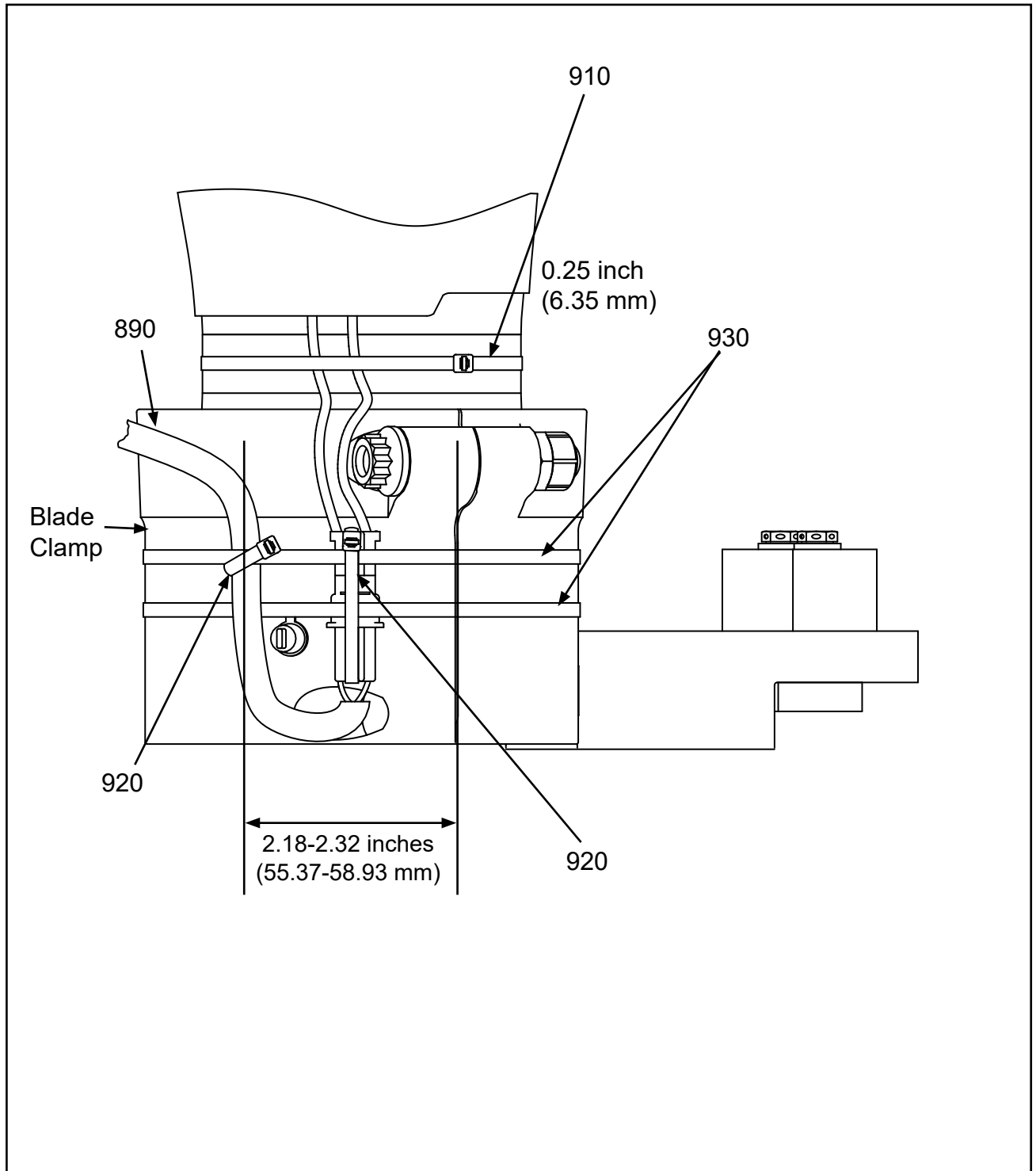
The actual location of the de-ice boot lead wires may vary  
depending on the installed de-ice boot.

**Wire Harness and Tie Straps to Clamp**  
**Figure CS-2, page 1 of 2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**105339**

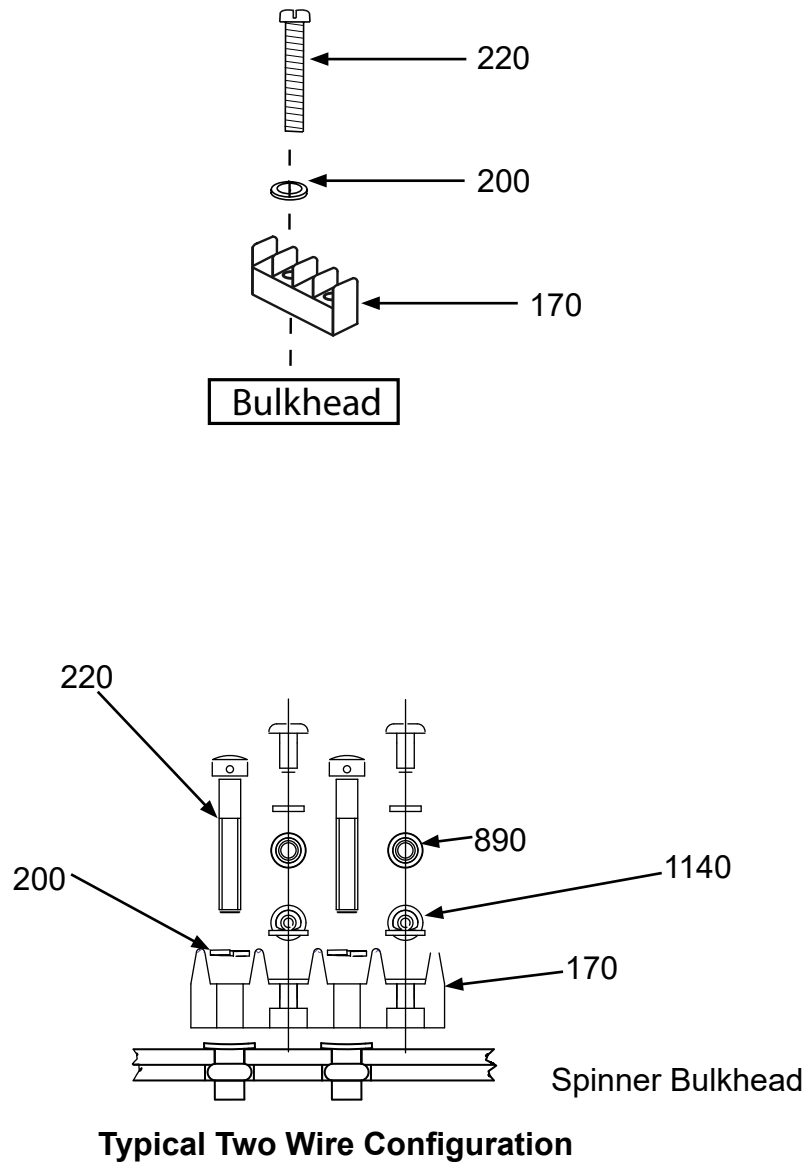


**Wire Harness and Tie Straps to Clamp  
Figure CS-2, page 2 of 2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**105339**

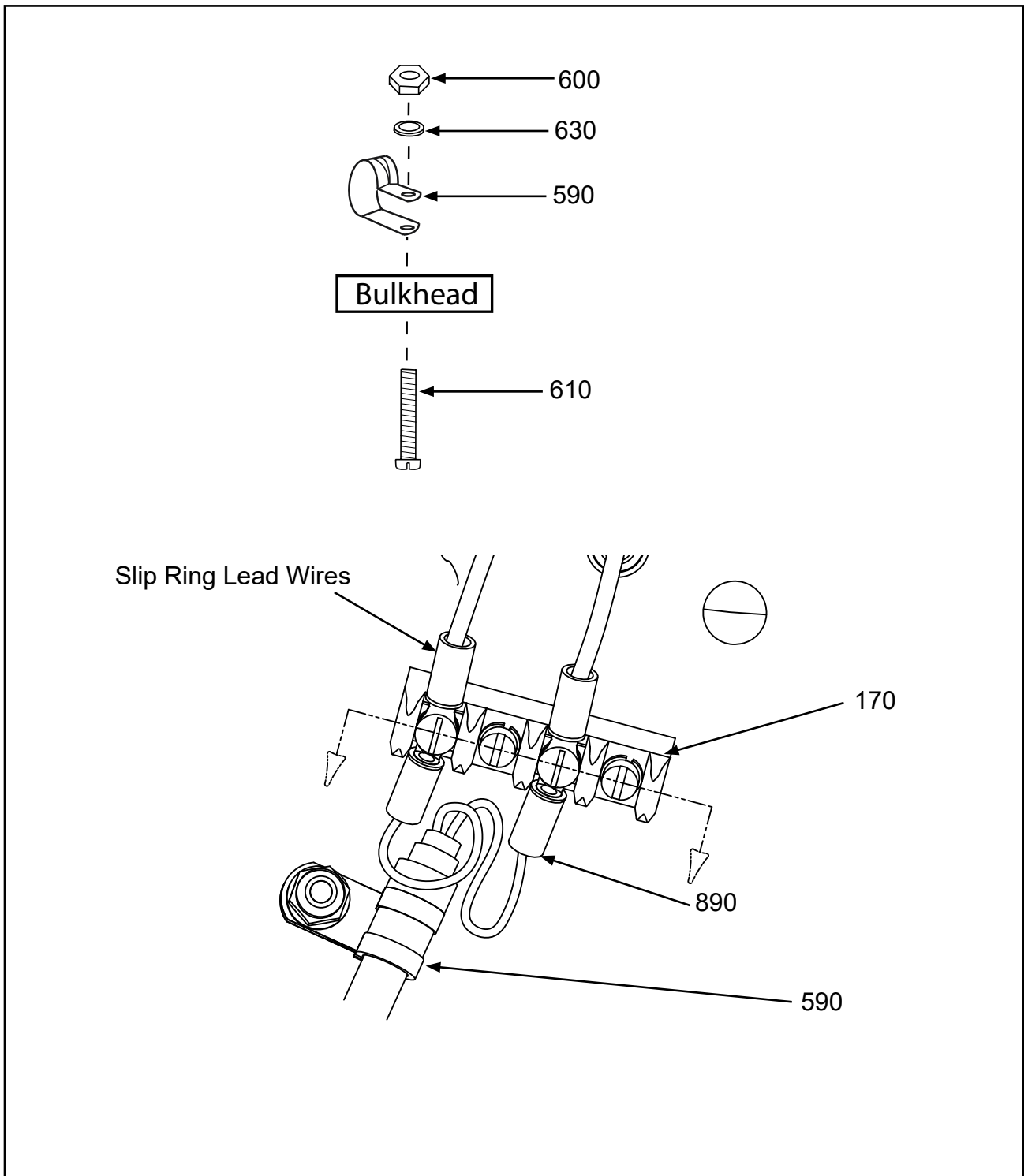


**Terminal Strip  
Figure CS-3**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**105339**



**Loop Clamp to Bulkhead  
Figure CS-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**105339**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>105339</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11CS</b> <b>FIGURES: CS-1 thru CS-4</b>		
170	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM	3	
200	B-3854-41	• WASHER, LOCK	6	Y
220	B-6631-233	• SCREW, 6-32, FILLISTER HEAD, CRES	6	Y
590	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	3	Y
600	B-6655-08	• NUT, HEX, SELF-LOCKING	3	Y
610	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	3	Y
630	B-3837-N832	• WASHER, CORROSION RESISTANT	3	Y
890	3H2092-2	• WIRE HARNESS	3	Y
910	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	3	Y
920	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	6	Y
930	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	6	Y
1140	4H2551-1	• SLIP RING ASSEMBLY	1	
1155	A-2070-10	• SCREW, 1/4-28, BUTTON HEAD	9	Y
1170	A-2070-9	• SCREW, 1/4-28, BUTTON HEAD	3	Y
1180	B-7077-52	• BELLEVILLE SPRING WASHER	24	Y
1190	B-3808-4	• NUT, HEX, SELF-LOCKING	12	Y
1200	B-3837-0432	• WASHER, CORROSION RESISTANT	12	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 105339**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**105551**

**CT.    Installation Instruction 11CT**

- (1) Using the screw (220), washers (200 and 210), tapped eyelet (190), attach the terminal strip (170) to the bulkhead in accordance with Figure CT-1.
  - (2) Torque the screw (220) to 10-12 In-Lb (1.1-1.3 N•m).
  - (3) Using the screws (1170), attach the slip ring (1140) and the bulkhead to the hub as shown in Figure CT-2.
  - (4) Torque each screw (1170) 96-120 In-Lb (10.1-13.5 N•m).
  - (5) Complete a slip ring run-out check in accordance with the Check chapter of this manual.
  - (6) Install the bracket (1300), spacer (1325), and washers (1305) on the hub clamping bolt (1315) between the hub and the nut in accordance with Figure CT-3.
    - (a) Install a minimum of one washer (1305) between the hub and the bracket (1300).
    - (b) Additional washers (1305) may be used to get the correct thread engagement and to make sure that a minimum of one exposed thread is above the nut.
  - (7) Align the centerline of the bracket (1300) toward the center of the middle hub clamping bolt as shown in Figure CT-3.
  - (8) Torque the hub clamping nut to 20-22 Ft-Lb (28-30 N•m).
  - (9) Put the propeller blades at reverse blade angle.
  - (10) If required, press the spring pin (905) perpendicularly into the hole in the counterweight as shown in Figure CT-4.
    - (a) The spring pin (905) must extend to a height of 0.170 - 0.210 inch (4.32 - 5.33 mm).
- NOTE:**    The counterweight may have been drilled for the spring pin (905) or may have an integral (cast) pin in place of the spring pin.
- (11) Assemble the plug connection between the wire harness (890) and the de-ice boot.
  - (12) Install the wire harness/de-ice boot plug connections in the groove in the counterweight against the spring pin (905) as shown in Figure CT-5.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**105551**

**CT.    Installation Instruction 11CT - continued**

- (13) Install the tie strap (910) in the retaining groove of the counterweight and around the counterweight, and between the wires of the wire harness/de-ice boot plug connection. Refer to Figure CT-5

**CAUTION:**    ROUTING THE TIE STRAP (910) INCORRECTLY CAN CAUSE  
AN ELECTRICAL SHORT IN THE DE-ICE SYSTEM.

- (a)    Route the tie strap (910) between wires 2 and 3 on the de-ice boot lead wires.
- (b)    Route the tie strap (910) between wire 1 and 2 on the wire harness lead wires.
- (14) Position the head of the tie strap (910) in the approximate location shown in Figure CT-5.
- (15) Make sure the tie strap (910) is in the retaining groove of the counterweight.
- (16) Tighten the tie strap (910).
- (17) Install the tie strap (920) around the blade shank and over the de-ice boot lead wires as shown in Figure CT-6.
- (18) Locate the head of the tie strap (920) at the blade trailing edge as shown in Figure CT-6.
- (19) Tighten the tie strap (920).
- (20) Using the tie strap (930), secure the de-ice boot lead wires to the tie strap (910) as shown in Figure CT-5.
- (21) Install the clamp (660) around the wire harness (890) and against the O-ring as shown in Figure CT-7.
- (22) Apply threadlocker CM399 to the threads of the screw (650).
- (23) Using the screw (650) and washers (630), install the clamp (660) to the counterweight and perpendicular to the hub surface in accordance with Figure CT-7.
- (24) Torque the screw (650) to 20-22 In-Lb (2.3-2.4 N•m).
- (25) Position the de-ice boot lead wire on the bracket (1300) with the O-ring as shown in Figure CT-3.
- (26) Install the tie straps (930). Twisting of the lead wires is not permitted.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

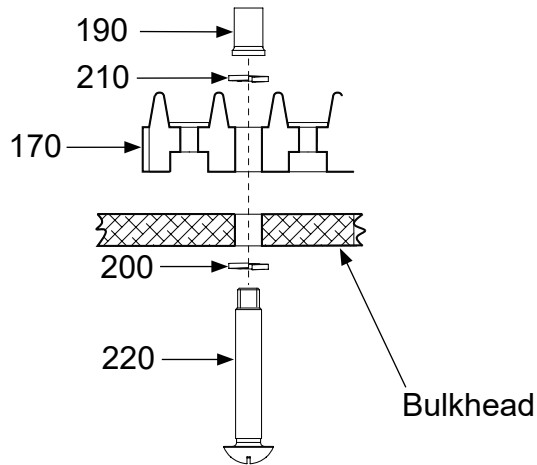
**105551**

CT. Installation Instruction 11CT - continued

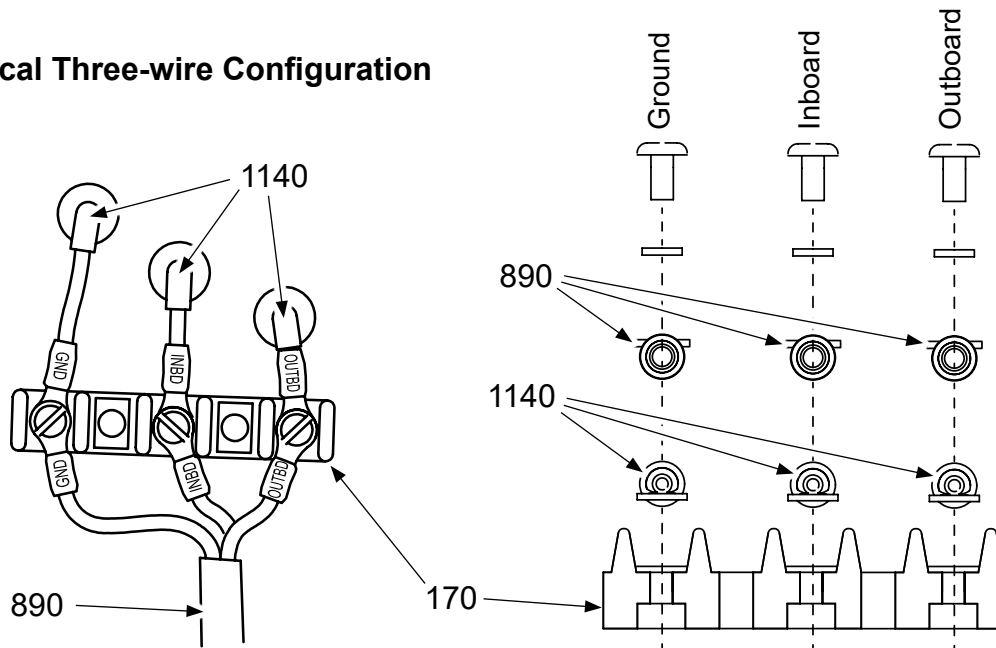
- (27) Route the wire harness (890) under the slip ring lead wires (1140) as shown in Figure CT-3.
- (28) Attach the slip ring lead wires and de-ice wire harness (890) to the terminal strip (170) in accordance with Figure CT-1.
- (29) Tighten the terminal screws until snug.
- (30) Cycle the propeller from reverse angle to feather angle to make sure of proper wire harness installation. Make sure the wire harness is not blocked during cycling.

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**105551**



## Typical Three-wire Configuration



**NOTE:** The illustrations show slip ring wires on a  
typical right-hand (rotation) propeller.

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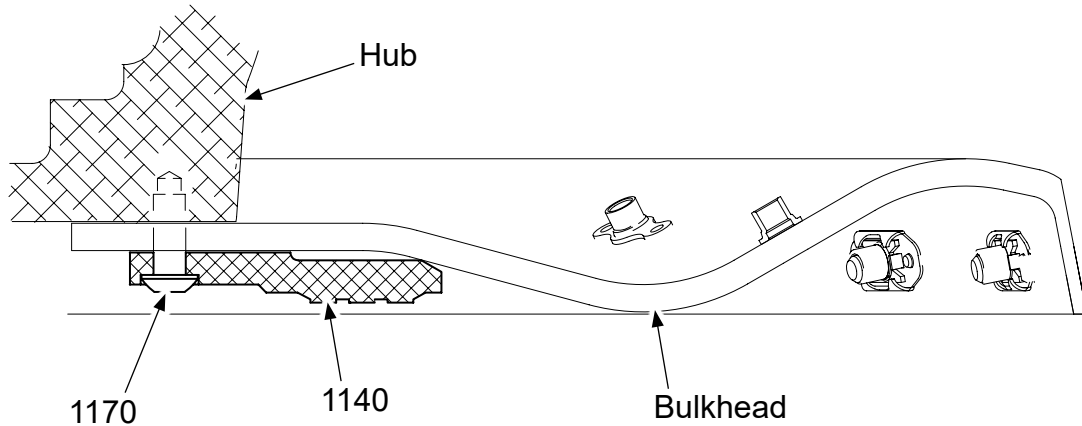
**Terminal Strip Hardware Configuration: Bulkhead Mounted  
Figure CT-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

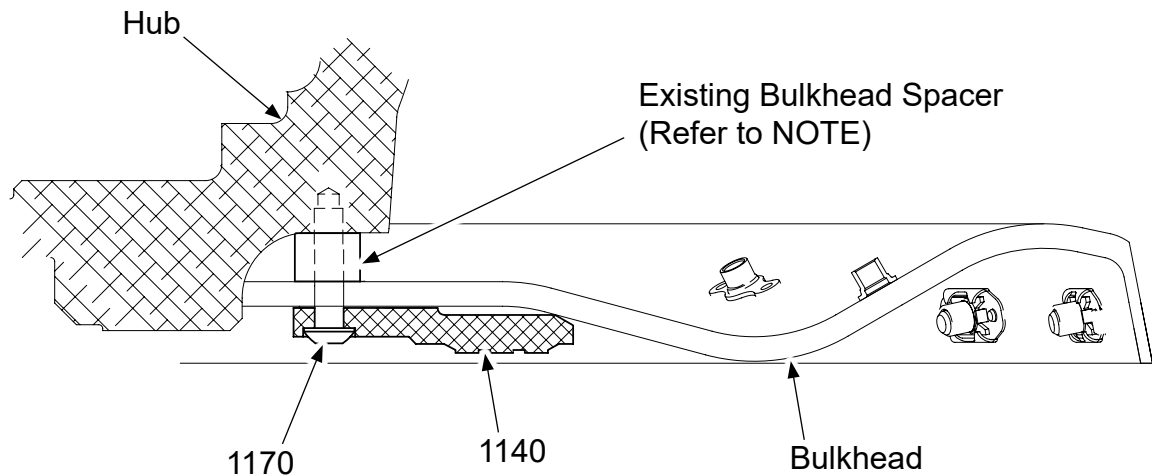
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**105551**

**Typical Slip Ring Installation (without bulkhead spacer)**



**Typical Slip Ring Installation (with bulkhead spacer)**



**NOTE:** The bulkhead spacer is a spinner mounting component and is application specific. Refer to Hartzell Propeller Application Guide Manual 159 (61-02-59).

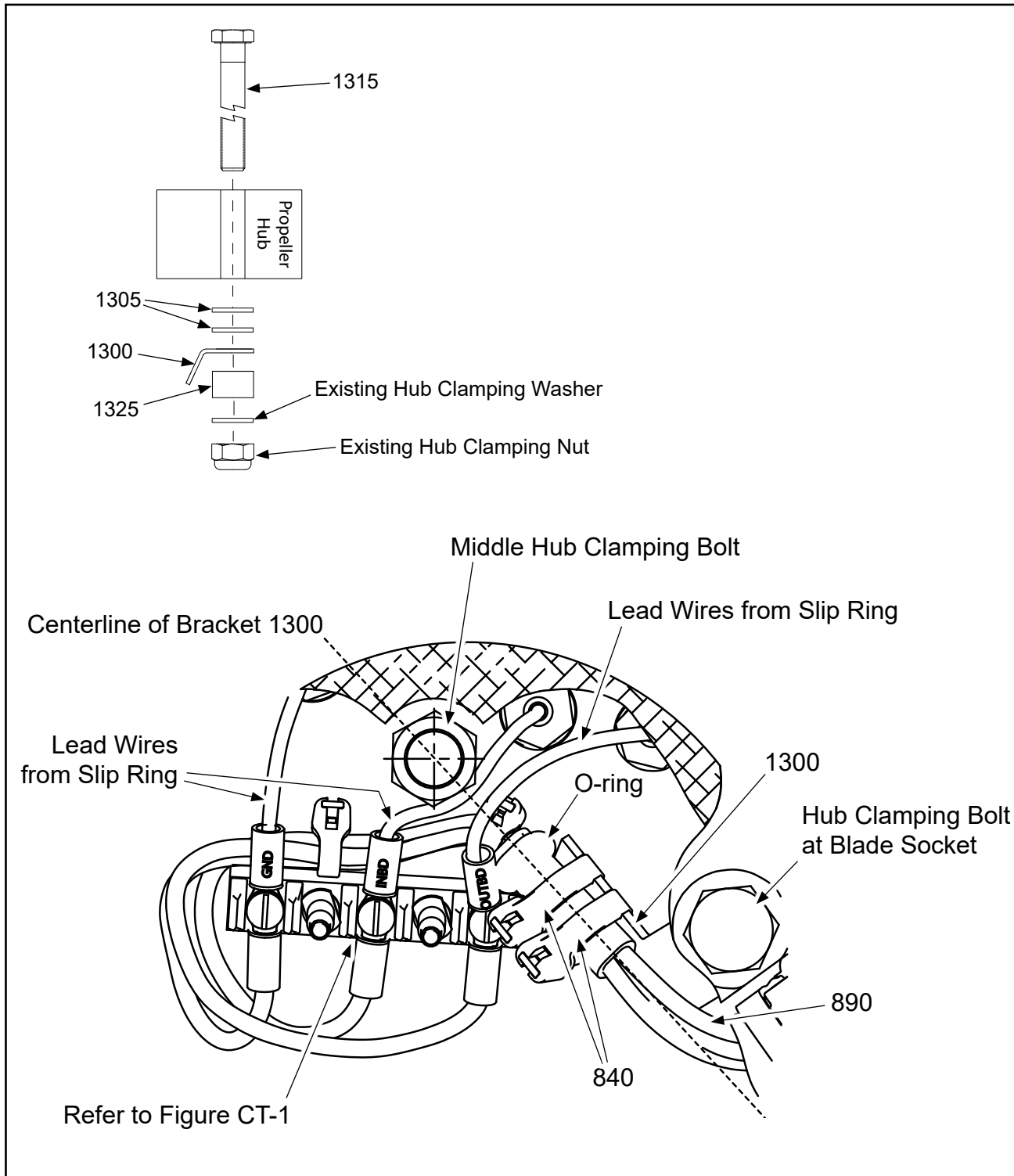
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**Slip Ring Mounting  
Figure CT-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**105551**

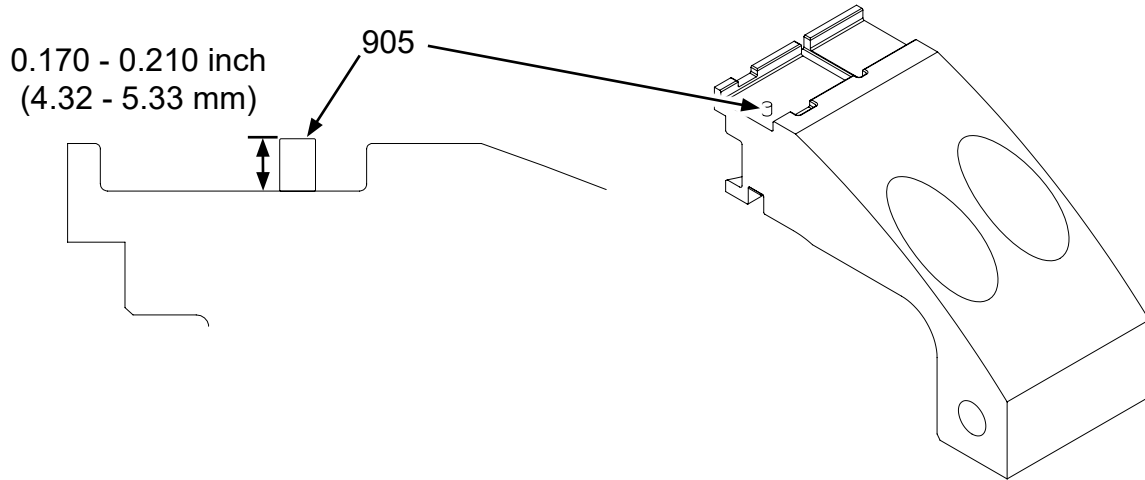


**Wire Harness Bracket Hardware Configuration  
Figure CT-3**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**105551**

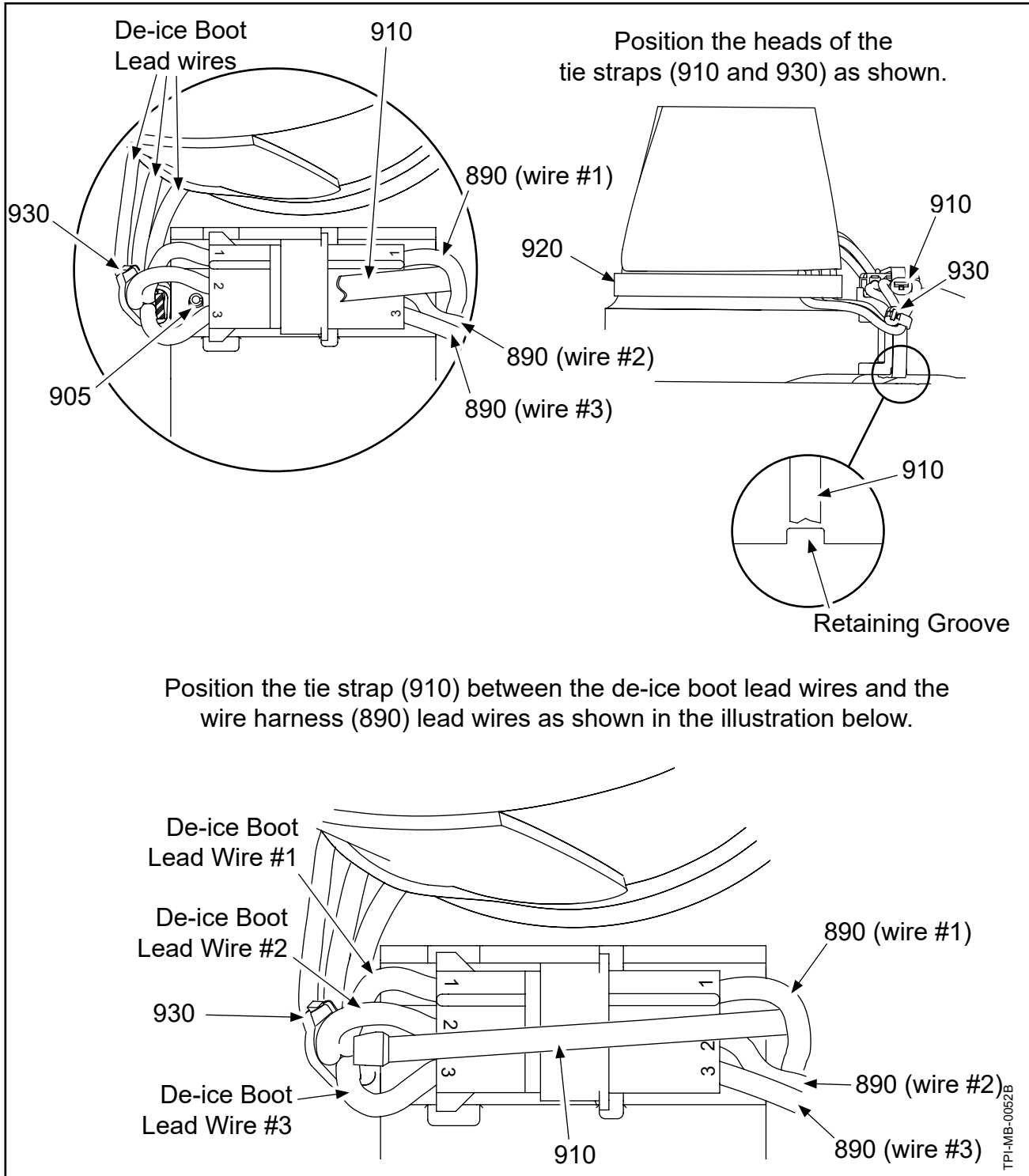


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**Spring Pin Height  
Figure CT-4**

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

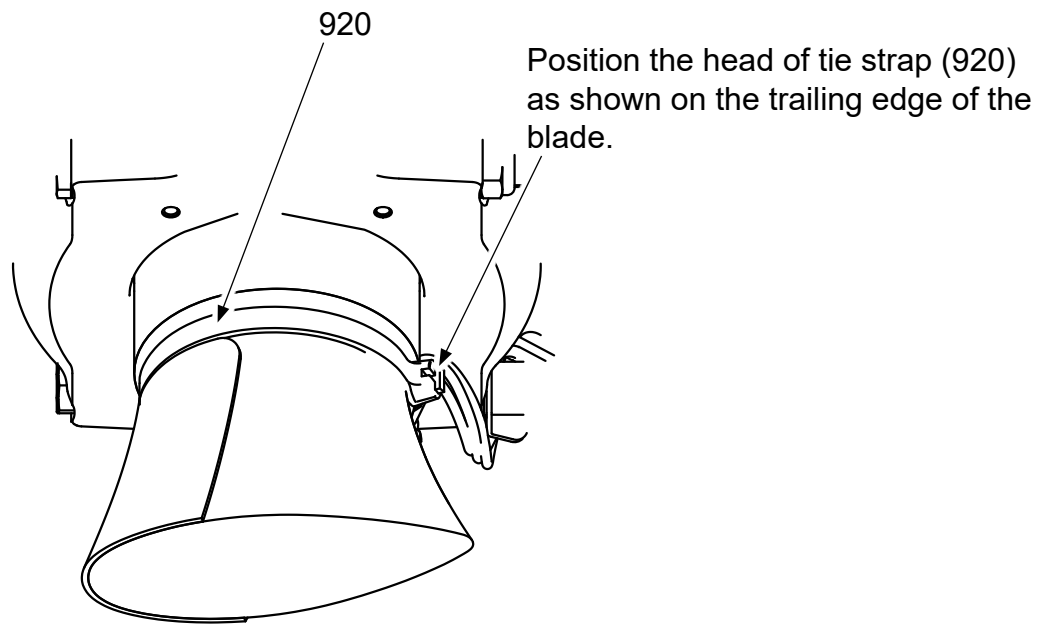
This section includes the parts list(s) and installation instructions for the following electric de-ice kit(s):  
**105551**



**Wire Harness to Blade Shank/Counterweight**  
**Figure CT-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**105551**

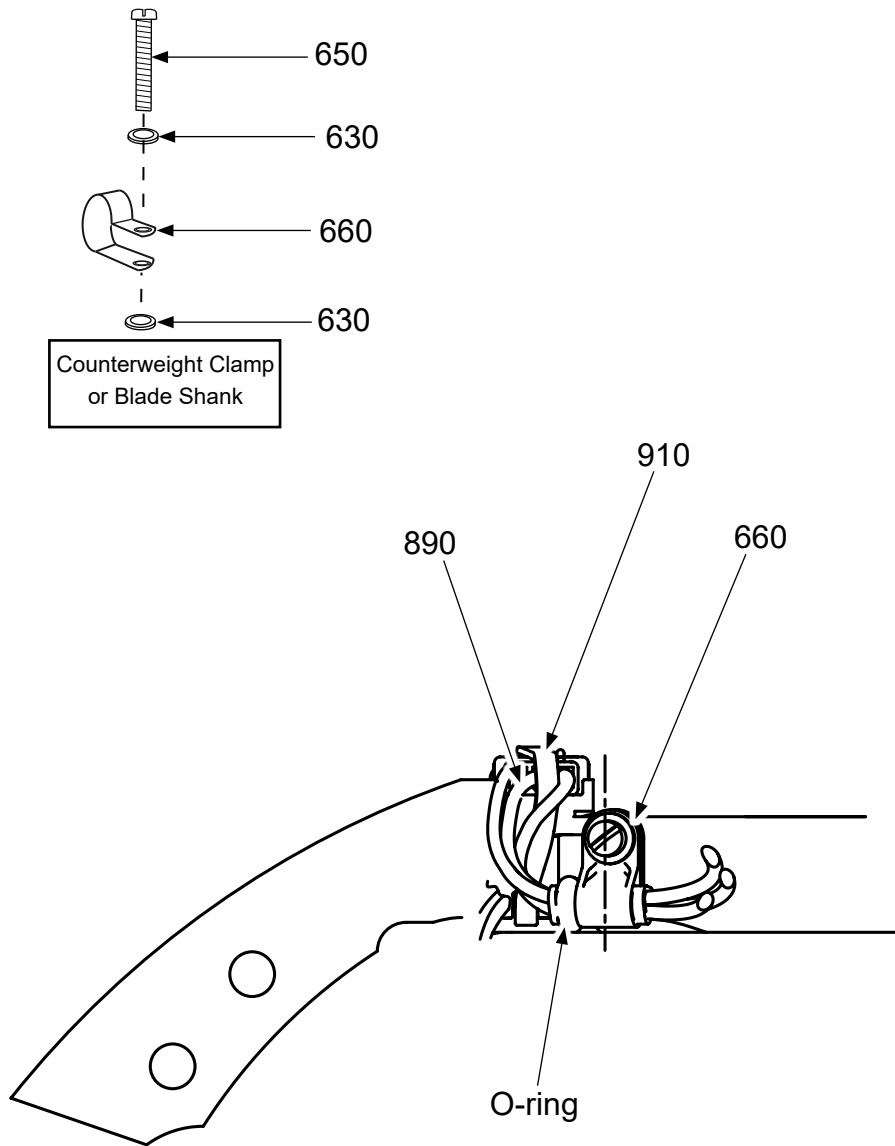


TI-180100155

**Wire Harness to Blade Shank  
Figure CT-6**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**105551**



TI-180100154

**Loop Clamp Orientation  
Figure CT-7**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**105551**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>105551</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11CT FIGURES: CT-1 thru CT-7</b>		
170	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM	5	
190	2H1365	• TAPPED EYELET	10	Y
200	B-3854-41	• WASHER, LOCK	10	Y
210	B-3854-41	• WASHER, LOCK	10	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	10	Y
630	B-3837-0332	• WASHER, CORROSION RESISTANT	10	Y
645	B-3855-32	• DELETED	-	
650	B-3840-( )	• SCREW, 10-32, FILLISTER HEAD, CRES	5	Y
660	B-3853-F5	• CLAMP, LOOP, PLASTIC	5	Y
840	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	10	Y
890	105555	• DE-ICE WIRE HARNESS	5	Y
905	B-3842-0437	• SPRING PIN, 3/32", CRES	5	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	5	Y
920	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	5	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	5	Y
1140	105043	• SLIP RING ASSEMBLY	1	
1170	A-2070-11	• SCREW, 1/4-28, BUTTON HEAD	10	Y
1300	105558	• BRACKET, WIRE HARNESS	5	
1305	B-3834-0632	• WASHER	15	Y
1315	A-3219-1	• BOLT, 3/8-24, HEX HEAD	5	
1315A	107083	• BOLT, 3/8-24, HEX HEAD ALTERNATE FOR ITEM 1315, POST HC-SL-30-365	5	
1325	A-2246	• SPACER ALUMINUM	5	

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 105551**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**105551**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**105934**

**CU.    Installation Instruction 11CU**

- (1) Using the screw (220), washers (200 and 210), and tapped eyelet (190), attach the terminal strip (170) to the bulkhead in accordance with Figure CU-1.
  - (a) Torque the screw (220) to 10-12 In-Lb (1.1-1.3 N•m).
- (2) Using the screws (1170), attach the slip ring (1140) and the bulkhead to the hub as shown in Figure CU-2.
  - (a) Torque each screw (1170) 96-120 In-Lb (10.1-13.5 N•m).
- (3) Complete a slip ring run-out check in accordance with the Check chapter of this manual.
- (4) Put the propeller blades at reverse blade angle.
- (5) If required, press the spring pin (905) perpendicularly into the hole in the counterweight as shown in Figure CU-3.
  - (a) The spring pin (905) must extend to a height of 0.170 - 0.210 inch (4.32 - 5.33 mm).

**NOTE:**    The counterweight may have been drilled for the spring pin (905) or may have an integral (cast) pin in place of the spring pin.

- (6) Assemble the plug connection between the wire harness (890) and the de-ice boot.
- (7) Install the wire harness/de-ice boot plug connections in the groove in the counterweight against the spring pin (905) or integral cast pin as shown in Figure CU-4.
- (8) Install the tie strap (910) in the retaining grooves of the counterweight and around the counterweight and between the wires of the wire harness/de-ice boot plug connection as shown in Figure CU-4.

**CAUTION:**    ROUTING THE TIE STRAP (910) INCORRECTLY CAN CAUSE AN ELECTRICAL SHORT IN THE DE-ICE SYSTEM.

- (a) On the boot-side of the plug connection, install the tie strap (910) between wire 2 and wire 3 as shown in Figure CU-4.
  - (b) On the wire harness-side of the plug connection, install the tie strap (910) between wire 1 and wire 2 as shown in Figure CU-4.
  - (c) Position the head of tie strap (910) in the approximate location shown in Figure CU-4.
- (9) Using the tie strap (930), attach the de-ice boot lead wires to the tie strap (910) as shown in Figure CU-4.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**105934**

**CU.**    Installation Instruction 11CU - continued

- (10) Install the tie strap (920) around the blade shank and over the de-ice boot lead wires as shown in Figure CU-4.
  - (a) The head of tie strap (920) must be positioned in line with the balance weight hole when the propeller is in feather position as shown in Figure CU-5.
- (11) Install the clamp (660), around the wire harness (890) and position it against the O-ring as shown in Figure CU-6.
- (12) Position the centerline of the clamp (660) to meet the clearance dimension between the O-ring on the wire harness (890) and the hub surface as shown in Figure CU-6.
- (13) Apply threadlocker CM399 to the threads of the screw (650).
- (14) Using screw (650) and washers (630), install the clamp (660) to the counterweight in accordance with Figure CU-6.
  - (a) Torque the screw (650) to 20-22 In-Lb (2.3-2.4 N•m).
- (15) Install the wire harness bracket (1300), washers (1305), and aluminum spacer (1325) on the the hub clamping bolt in accordance with Figure CU-7.
  - (a) Install one washer (1305) between the head of the hub clamping bolt (1315) and the hub.
  - (b) Install a minimum of one washer (1305) between the wire harness bracket (1300) and the hub.
    - 1 Use additional washers (1305) between the hub and the wire harness bracket (1300) as necessary to get the correct thread engagement and to make sure that a minimum of one exposed thread is above the nut.
  - (c) Position the wire harness bracket (1300) with the centerline directed toward the center of the middle hub mounting bolt. Refer to Figure CU-7.
  - (d) Install the hub clamping nut.
  - (e) Torque the hub clamping nut to 20-22 Ft-Lb (28-29 N•m).
    - 1 A minimum of one thread must be visible above the hub clamping nut after it is torqued.



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

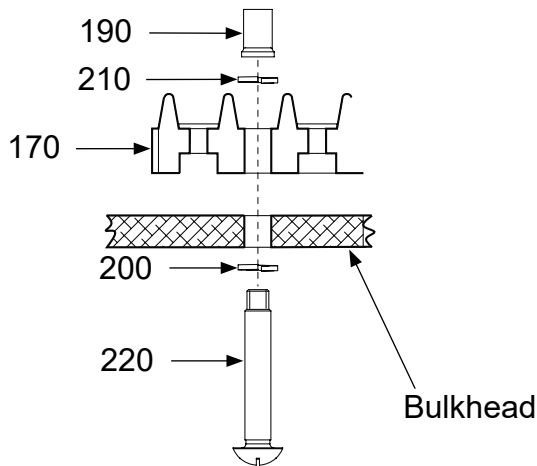
**105934**

CU. Installation Instruction 11CU - continued

- (16) Attach the de-ice boot wire harness (890) to the wire harness bracket (1300) as shown in Figure CU-7.
  - (a) Position the wire harness (890) on the bracket (1300) with the O-ring on top of the bracket.
  - (b) Attach the wire harness (890) to the bracket (1300) with the tie straps (840). Twisting of the lead wires is not permitted.
- (17) Attach the slip ring lead wires and de-ice wire harness (890) to the terminal strip (170) as shown in Figure CU-1.
  - (a) Route the wire harness (890) over the outboard wire from the slip ring, then under the inboard and ground wires from the slip ring as shown in Figure CU-7.
  - (b) Tighten the terminal screws until snug.
- (18) Cycle the propeller blades from reverse angle to feather angle to verify proper wire harness installation. Make sure the wire harness is not blocked during cycling.

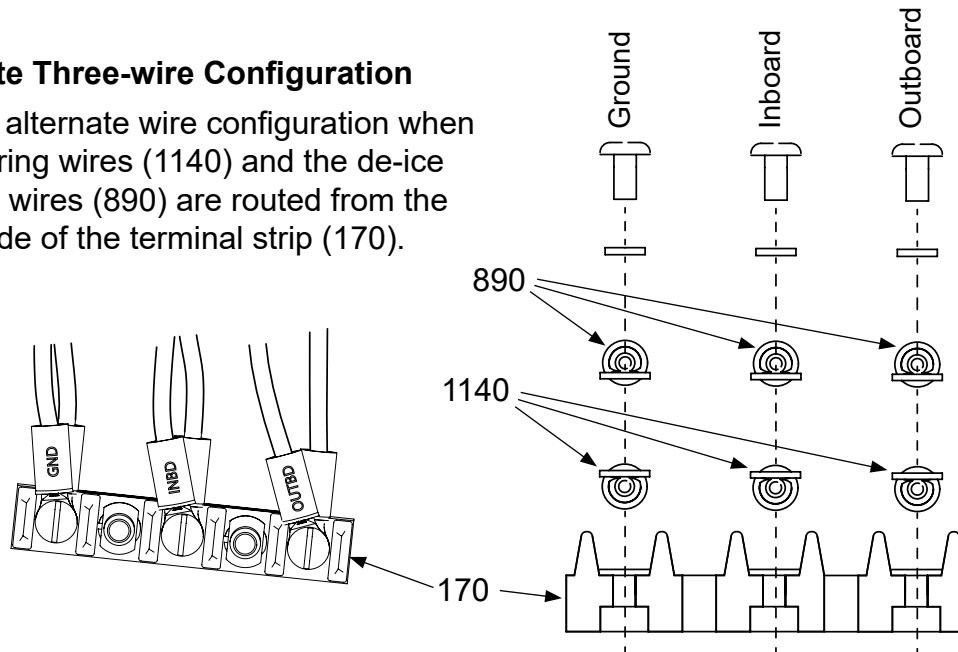
**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**105934**



**Alternate Three-wire Configuration**

Use the alternate wire configuration when the slip ring wires (1140) and the de-ice harness wires (890) are routed from the same side of the terminal strip (170).



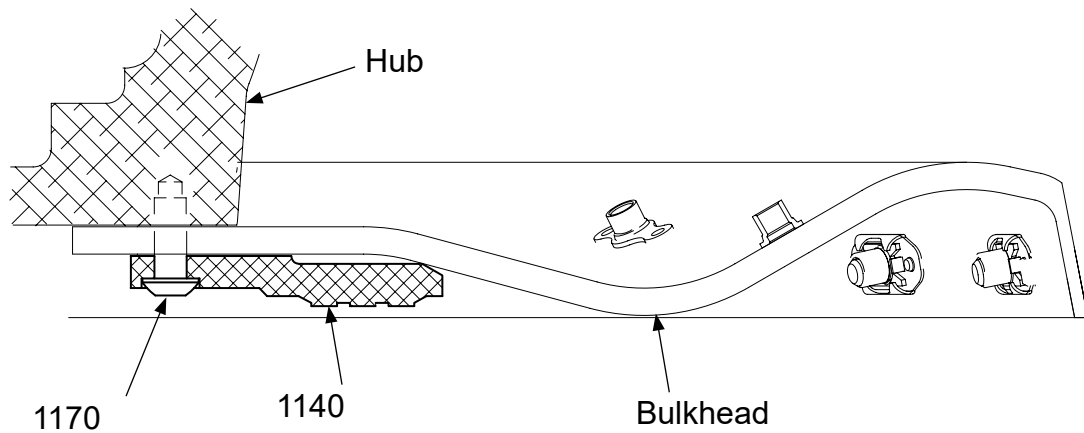
**NOTE:** The illustrations show slip ring wires on a typical right-hand (rotation) propeller.

TPI-MB-0134  
TPI-MB-0139

**Terminal Strip Hardware: Bulkhead Mounted  
Figure CU-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

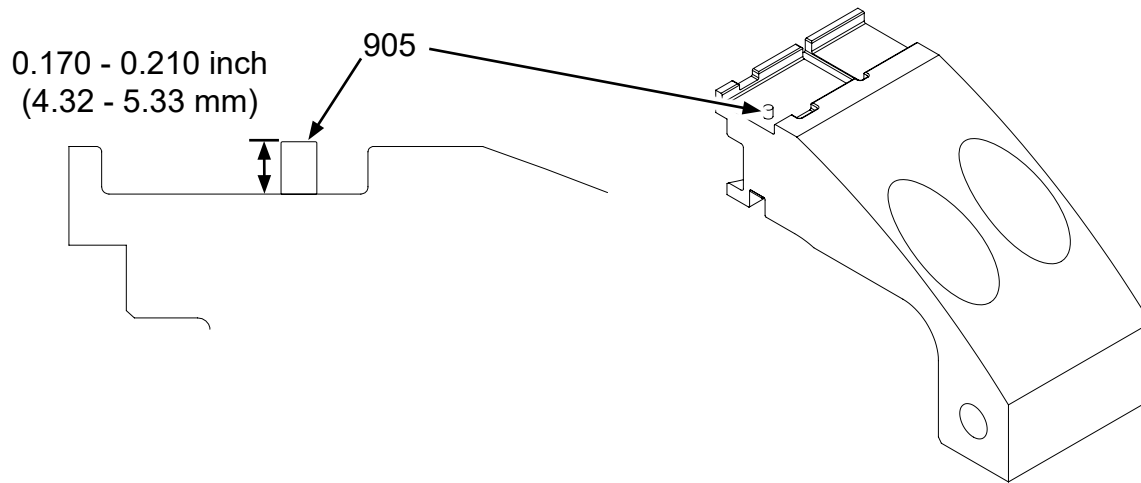
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**105934**



**Slip Ring Mounting  
Figure CU-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**105934**



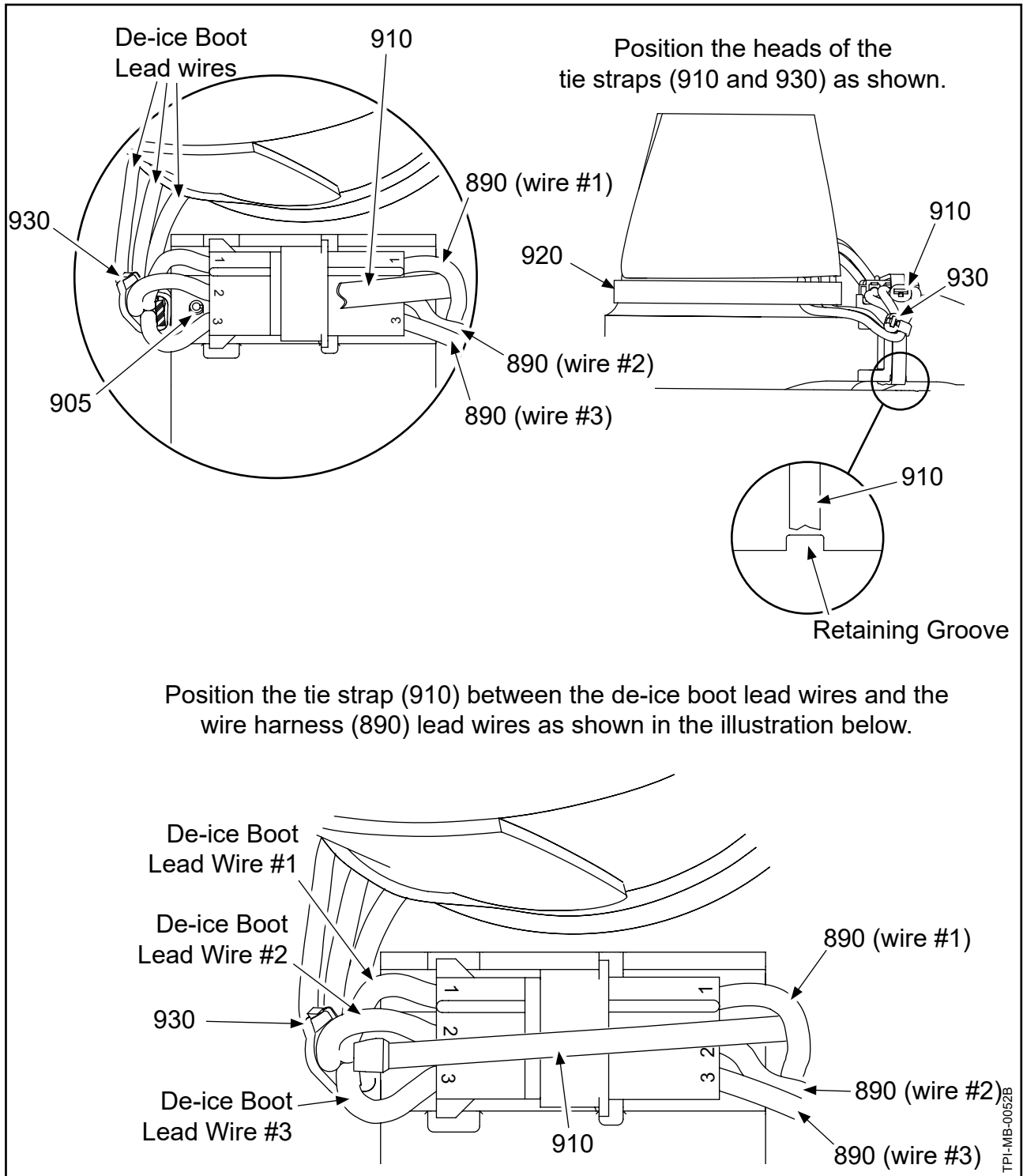
TP1MB-0078

**Spring Pin Height  
Figure CU-3**

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions for the following electric de-ice kit(s):

**105934**

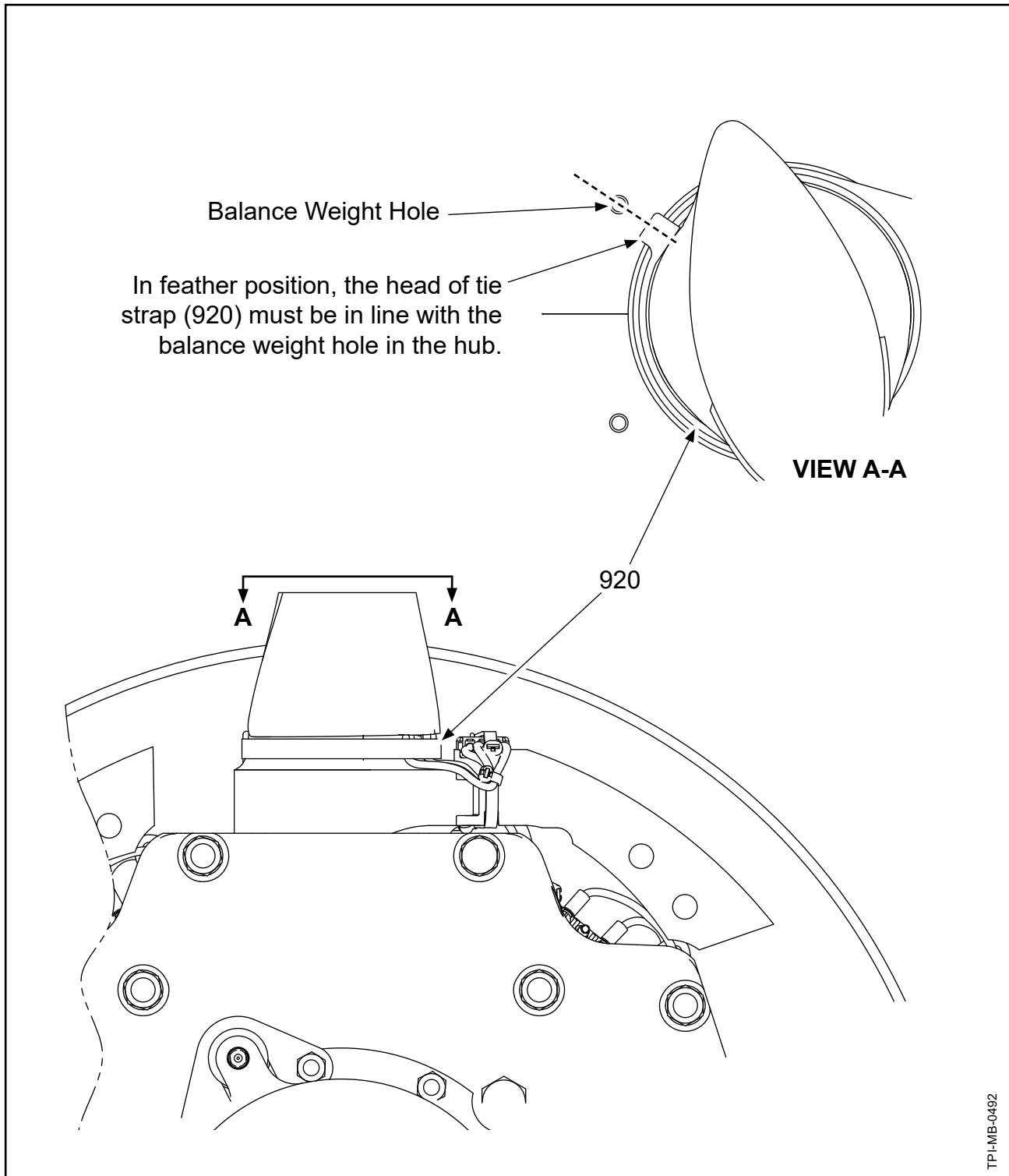


**Wire Harness to Blade Shank/Counterweight  
Figure CU-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**105934**

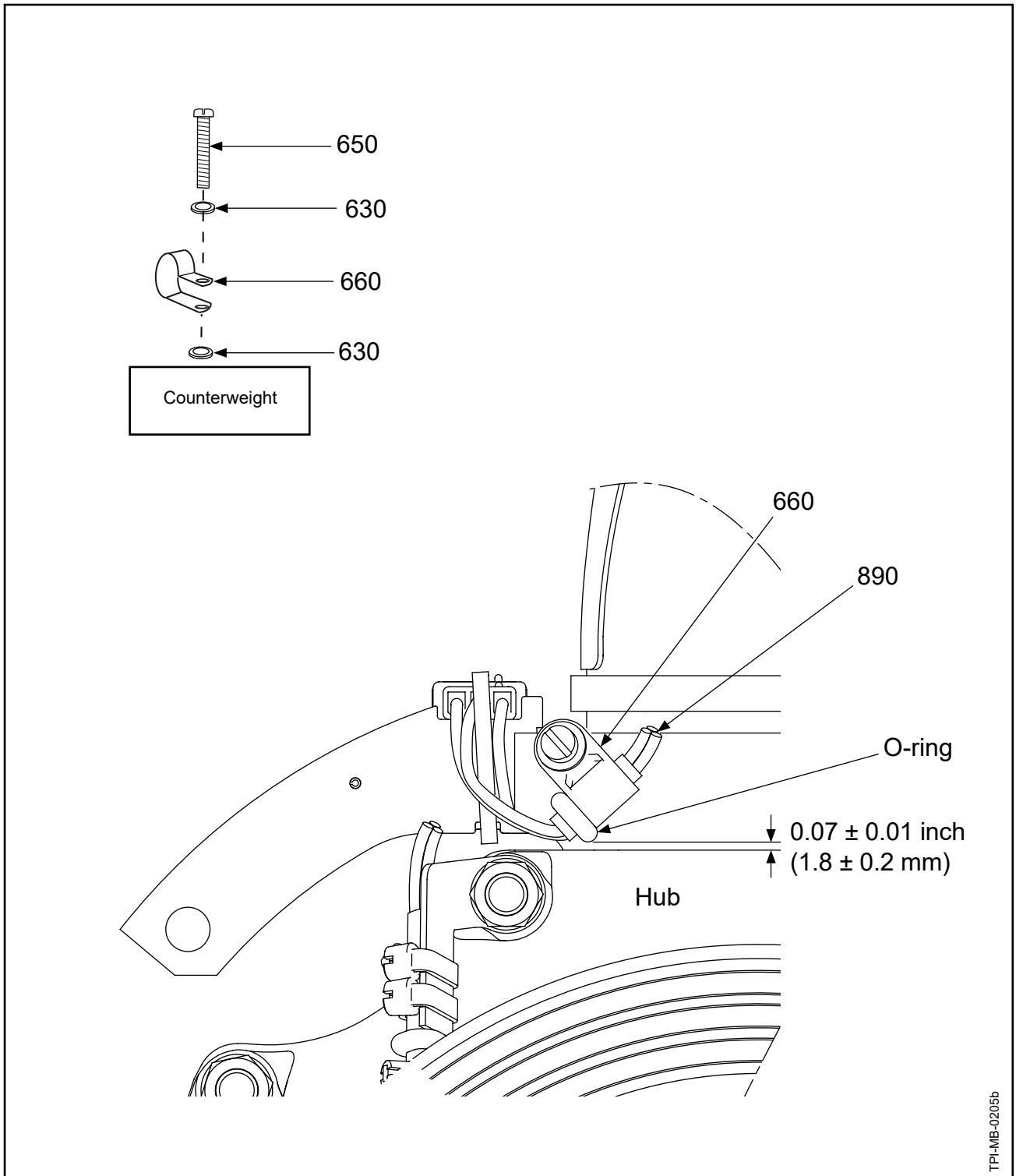


**Tie Strap Head Position  
Figure CU-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**105934**

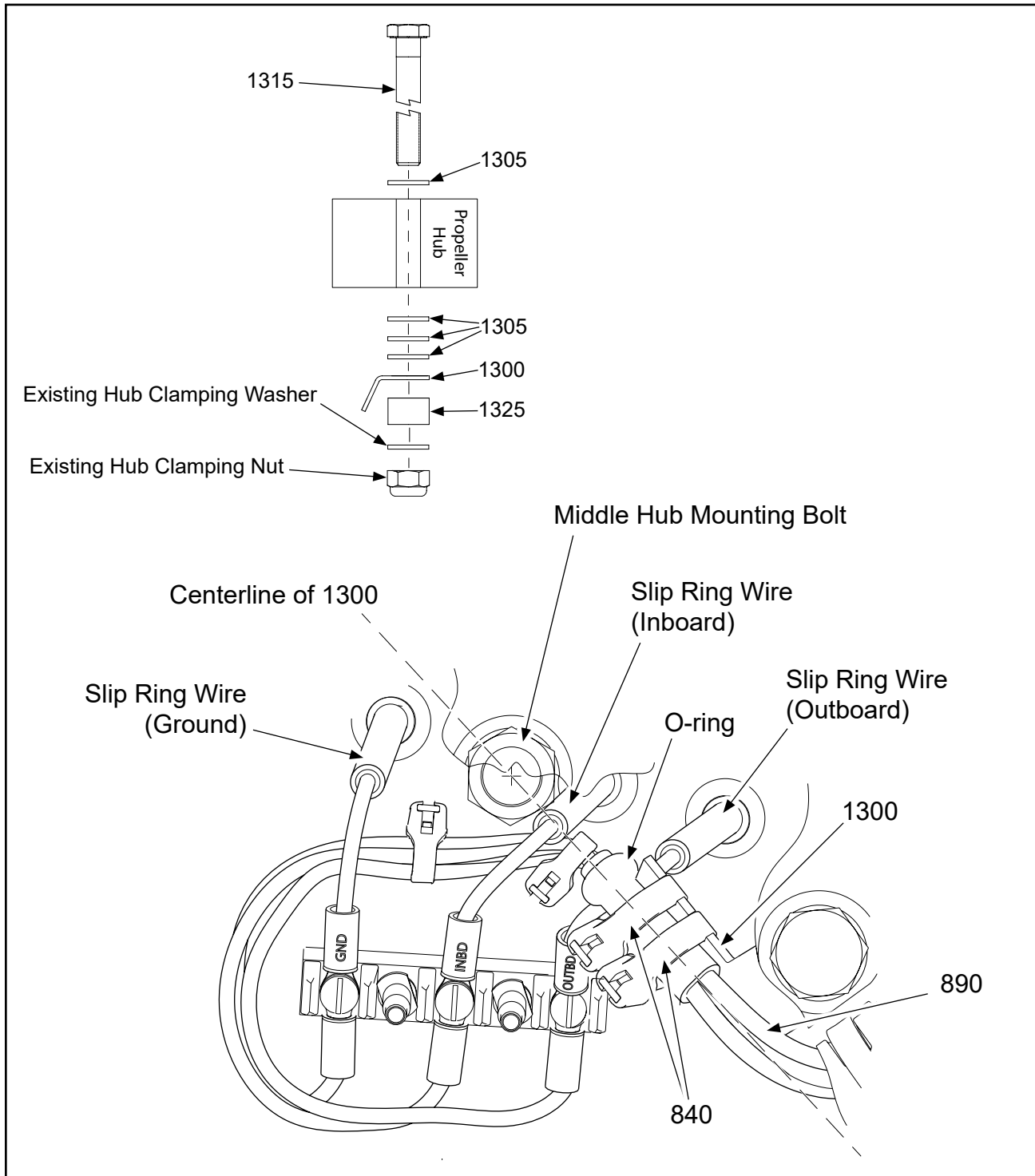


**Loop Clamp to Counterweight/Blade Shank  
Figure CU-6**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**105934**



**Wire Harness Bracket Hardware Configuration  
Figure CU-7**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**105934**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>105934</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11CU FIGURES: CU-1 THRU CU-7</b>		
170	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM	5	
190	2H1365	• TAPPED EYELET	10	Y
200	B-3854-41	• WASHER, LOCK	10	Y
210	B-3854-41	• WASHER, LOCK	10	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	10	Y
630	B-3837-0332	• WASHER, CORROSION RESISTANT	10	Y
645	B-3855-32	• DELETED	-	
650	B-3840-7	• SCREW, 10-32, FILLISTER HEAD	5	Y
660	B-3853-F5	• CLAMP, LOOP, PLASTIC	5	Y
840	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	10	Y
890	105555	• DE-ICE WIRE HARNESS	5	Y
905	B-3842-0437	• SPRING PIN, 3/32", CRES	5	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	5	Y
920	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	5	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	5	Y
1140	105882	• SLIP RING ASSEMBLY	1	
1170	A-2070-8	• SCREW, 1/4-28, BUTTON HEAD	10	Y
1300	B-6265	• BRACKET, WIRE HARNESS	5	
1305	B-3834-0632	• WASHER	20	Y
1315	A-3219-1	• BOLT, 3/8-24, HEX HEAD	5	
1315A	107083	• BOLT, 3/8-24, HEX HEAD	5	
		ALTERNATE FOR ITEM 1315, POST HC-SL-30-365		
1325	A-2246	• SPACER ALUMINUM	5	

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 105934**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**105934**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106049 and 106818**

**CV. Installation Instruction 11CV**

- (1) Using the screw (220), washers (200 and 210), tapped eyelet (190), attach the terminal strip (170) to the bulkhead in accordance with Orientation B shown in Figure CV-1.
    - (a) Torque the screw (220) to 10 - 12 In-Lb (1.2 - 1.3 N•m).
  - (2) Using the screws (1170) and the existing bulkhead spacers (if applicable), attach the slip ring (1140) and the bulkhead to the hub in accordance with Figure CV-2.
    - (a) Torque each screw (1170) to 8-10 Ft-Lbs (10.9-13.5 N•m).
    - (b) For propellers with existing bulkhead spacers only, wait five minutes after torquing the screws (1170), then re-torque each screw (1170) to 8-10 Ft-Lbs (10.9-13.5 N•m).
  - (3) Complete a slip ring run-out check in accordance with the Check chapter of this manual.
  - (4) Put the propeller blades at reverse blade angle.
  - (5) If required, press the spring pin (905) perpendicularly into the hole in the counterweight as shown in Figure CV-3.
    - (a) The spring pin (905) must extend to a height of 0.170 - 0.210 inch (4.32 - 5.33 mm).
- NOTE:** The counterweight may have been drilled for the spring pin (905) or may have an integral (cast) pin in place of the spring pin.
- (6) Assemble the plug connection between the wire harness (890) and the de-ice boot.
  - (7) Install the wire harness/de-ice boot plug connections in the groove in the counterweight against the spring pin (905) or integral cast pin as shown in Figure CV-4.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106049 and 106818**

CV. Installation Instruction 11CV - continued

- (8) Install the tie strap (910) in the retaining grooves of the counterweight and around the counterweight, and between the wires of the wire harness/de-ice boot plug connection as shown in Figure CV-4.

**CAUTION:**     ROUTING THE TIE STRAP (910) INCORRECTLY CAN CAUSE  
AN ELECTRICAL SHORT IN THE DE-ICE SYSTEM.

- (a) On the boot-side of the plug connection, install the tie strap (910) over pin location 3 on the connector as shown in Figure CV-4.
- (b) On the wire harness-side of the plug connection, install the tie strap (910) between wire 1 and wire 2 as shown in Figure CV-4.
- (c) Position the head of tie strap (910) in the approximate location shown in Figure CV-4.
- (9) Using the tie strap (930), attach the de-ice boot lead wires to the tie strap (910) as shown in Figure CV-4.
- (10) Install the tie strap (920) around the blade shank and over the de-ice boot lead wires as shown in Figure CV-4.
- (a) The head of tie strap (920) must be located at the trailing edge of the blade as shown in Figure CV-5.
- (11) Install the clamp (660), around the wire harness (890) and position against the O-ring as shown in Figure CV-6.
- (12) Position the centerline of the clamp (660) perpendicular to the hub surface as shown in Figure CV-6.
- (13) Apply threadlocker CM399 to the threads of the screw (650).
- (14) Using screw (650) and washers (630), install the clamp (660) to the counterweight in accordance with Figure CV-7.
- (a) Torque the screw (650) to 20-22 In-Lb (2.3-2.4 N•m).
- (15) Install the wire harness bracket (1300), washers (1305), and aluminum spacer (1325) on the the hub clamping bolt in accordance with Figure CV-8.
- (a) Install one washer (1305) between the head of the hub clamping bolt (1315) and the hub.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

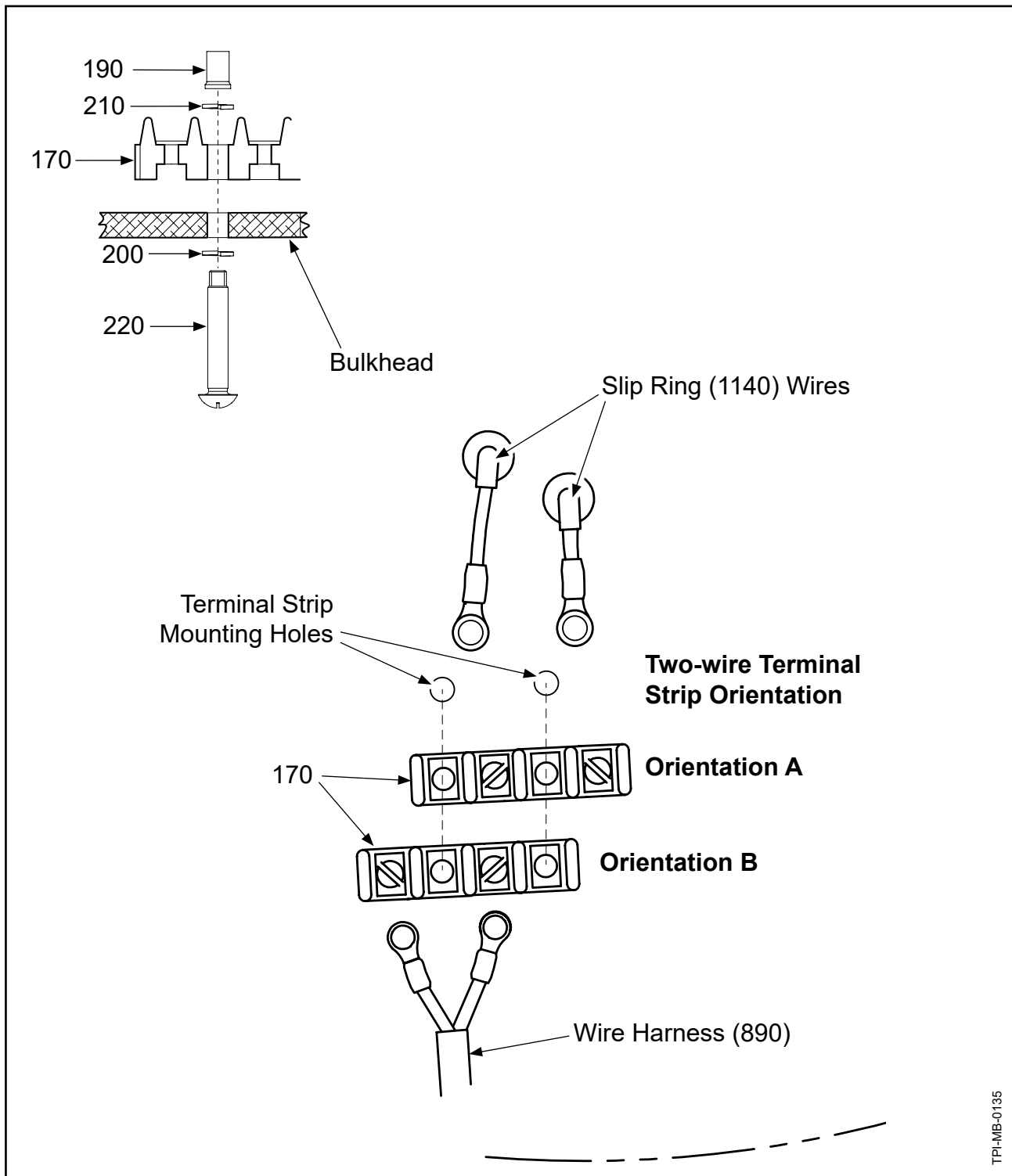
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106049 and 106818**

CV. Installation Instruction 11CV - continued

- (b) Install a minimum of one washer (1305) between the wire harness bracket (1300) and the hub.
  - 1 Use additional washers (1305) between the hub and the wire harness bracket (1300) as necessary to get the correct thread engagement and to make sure that a minimum of one exposed thread is above the nut.
- (c) Position the wire harness bracket (1300) with the centerline directed toward the center of the middle hub mounting bolt. Refer to Figure CV-8.
- (d) Install the hub clamping nut.
- (e) Torque the hub clamping nut to 20-22 Ft-Lb (28-29 N•m).
  - 1 A minimum of one thread must be visible above the hub clamping nut after it is torqued.
- (16) Attach the de-ice boot wire harness (890) to the wire harness bracket (1300) as shown in Figure CV-8.
  - (a) Position the wire harness (890) on the bracket (1300) with the O-ring on top of the bracket.
  - (b) Attach the wire harness (890) to the bracket (1300) with the tie straps (840). Twisting of the lead wires is not permitted.
- (17) Attach the slip ring lead wires and de-ice wire harness (890) to the terminal strip (170) in accordance with Figure CV-9.
  - (a) Route the wire harness (890) under both slip ring wires as shown in Figure CV-8
  - (b) Tighten the terminal screws until snug.
- (18) Cycle the propeller blades from reverse angle to feather angle to verify proper wire harness installation.
  - (a) Make sure the wire harness is not blocked during cycling.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106049 and 106818**

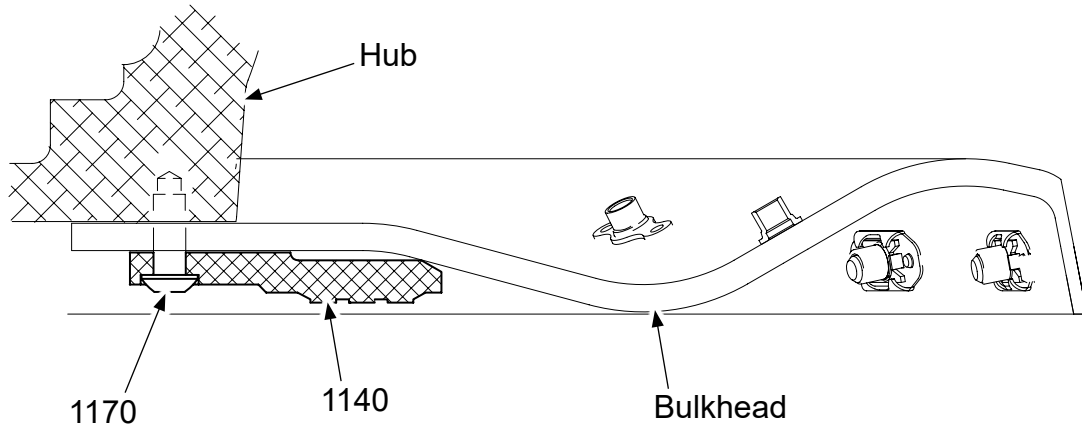


**Terminal Strip Hardware: Bulkhead Mounted  
Figure CV-1**

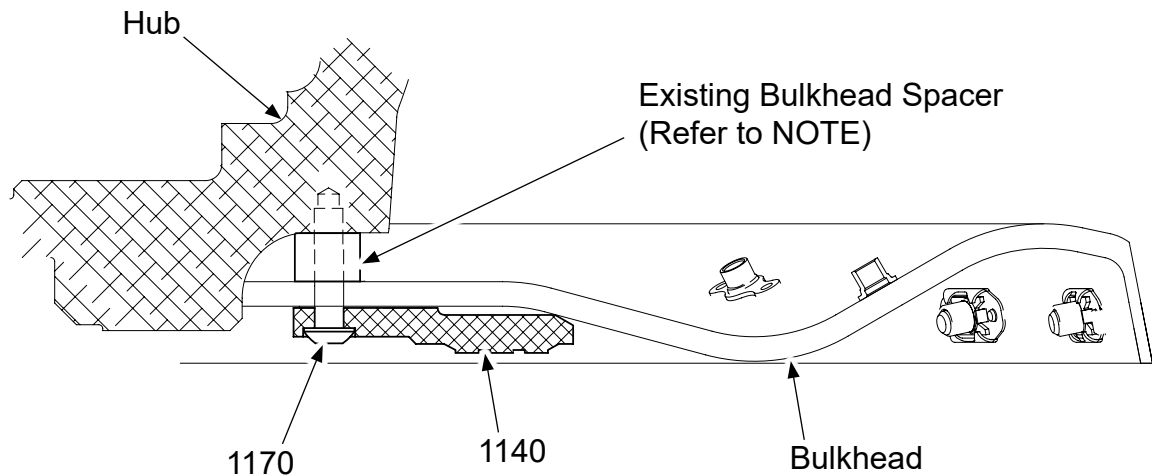
**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106049 and 106818**

**Typical Slip Ring Installation (without bulkhead spacer)**



**Typical Slip Ring Installation (with bulkhead spacer)**



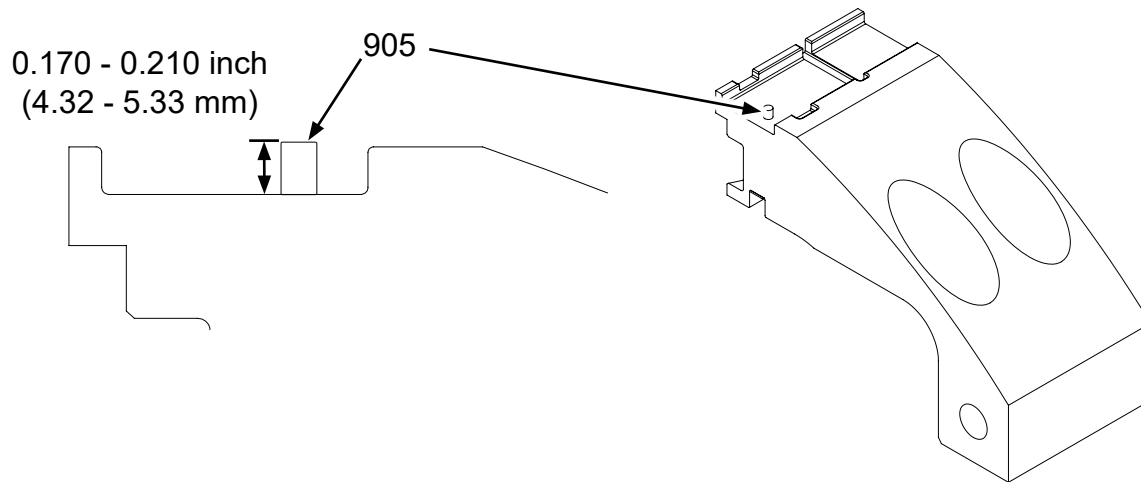
**NOTE:** The bulkhead spacer is a spinner mounting component and is application specific. Refer to Hartzell Propeller Application Guide Manual 159 (61-02-59).

TPI-MB-0204, TPI-MB-0223

**Slip Ring Mounting  
Figure CV-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106049 and 106818**



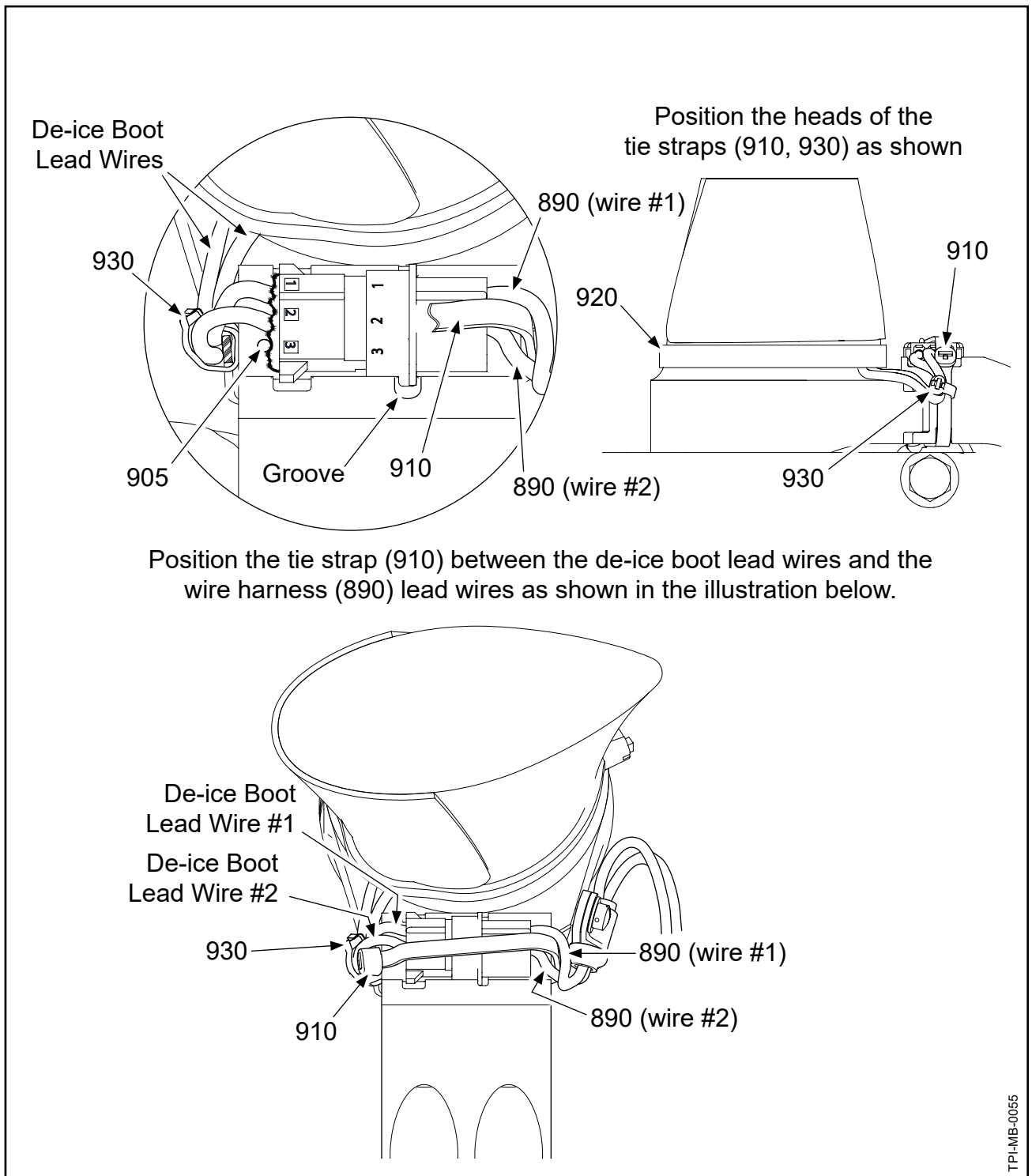
TPI-MB-0078

**Spring Pin Height  
Figure CV-3**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

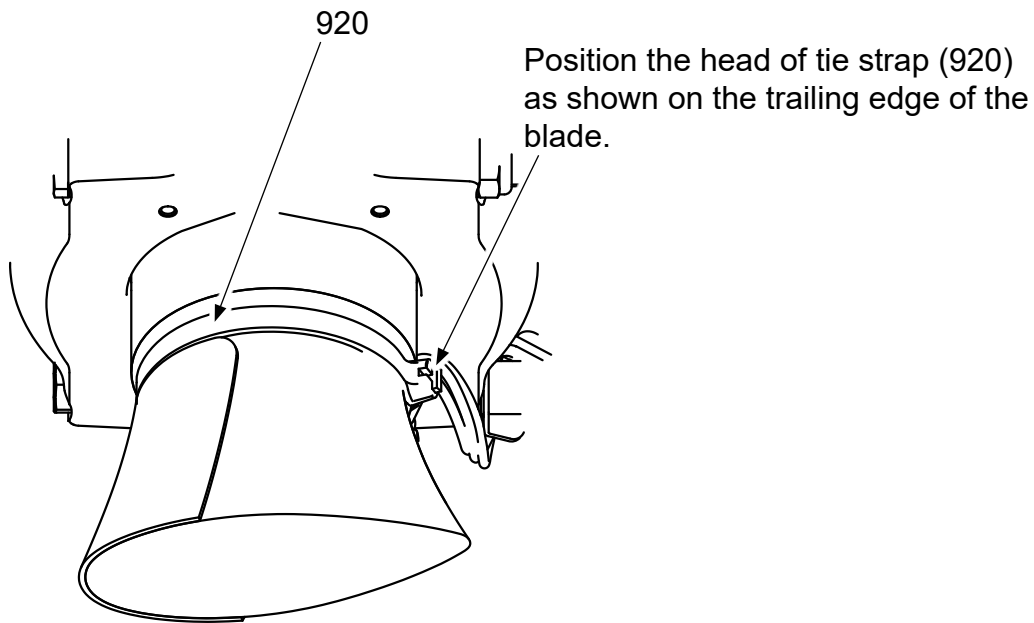
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106049 and 106818**



**Wire Harness to Blade Shank/Counterweight  
Figure CV-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106049 and 106818**



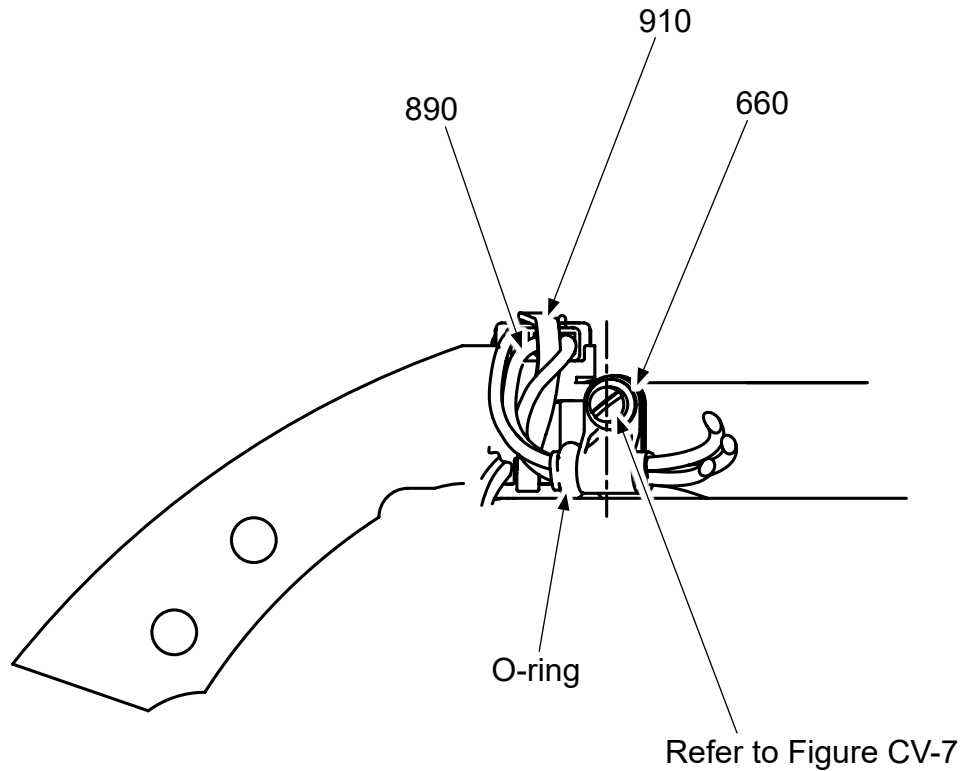
TI-180100155

**Wire Harness to Blade Shank  
Figure CV-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106049 and 106818**

The illustration shows a three-wire harness.  
The clamp and tie strap position for the two-wire harness is the same.

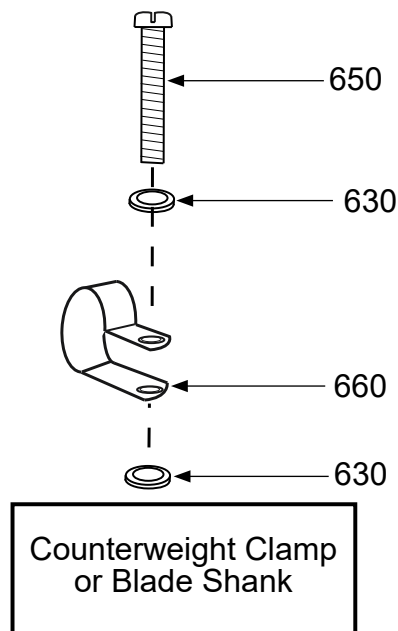


**Loop Clamp Orientation  
Figure CV-6**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

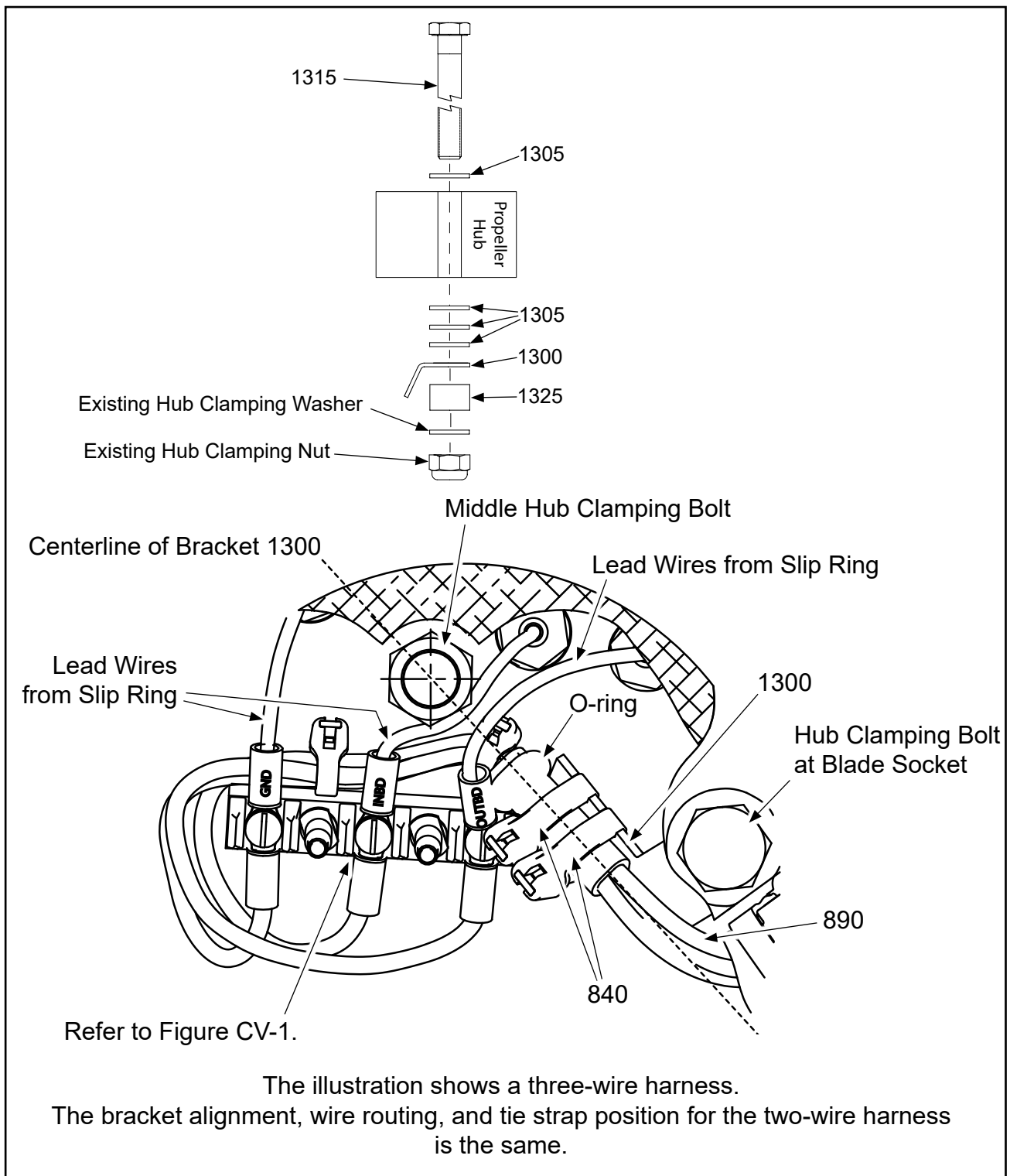
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106049 and 106818**



**Loop Clamp to Counterweight/Blade Shank Hardware Configuration  
Figure CV-7**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106049 and 106818**

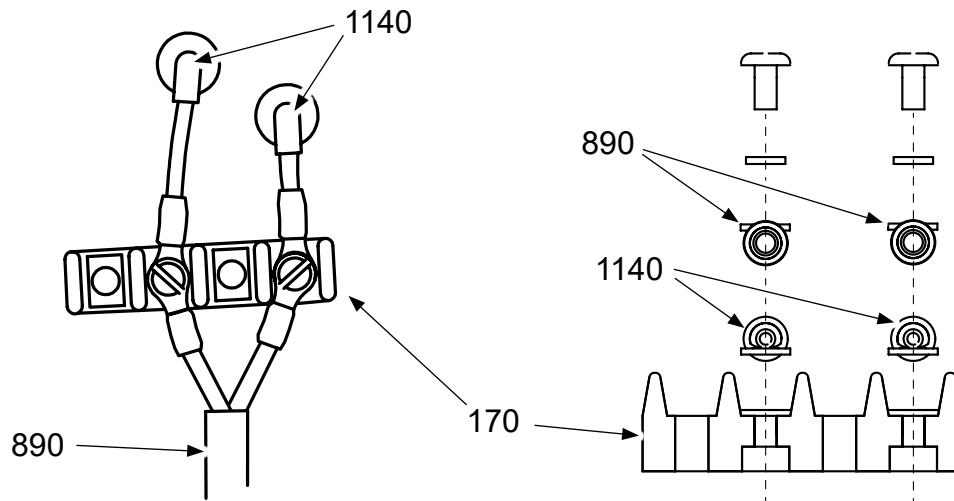


**Wire Harness Bracket Hardware Configuration  
Figure CV-8**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106049 and 106818**

**Typical Two-wire Configuration**



**NOTE:** The illustrations show slip ring wires on a  
typical right-hand (rotation) propeller.

**Terminal Strip Lead Wire Configuration: Bulkhead Mounted  
Figure CV-9**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106049 and 106818**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>106049</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11CV FIGURES: CV-1 thru CV-9</b>		
170	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM	5	
190	2H1365	• TAPPED EYELET	10	Y
200	B-3854-41	• WASHER, LOCK	10	Y
210	B-3854-41	• WASHER, LOCK	10	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	10	Y
630	B-3837-0332	• WASHER, CORROSION RESISTANT	10	Y
645	B-3855-32	• DELETED	-	
650	B-3840-7	• SCREW, 10-32, FILLISTER HEAD	5	Y
660	B-3853-F5	• CLAMP, LOOP, PLASTIC	5	Y
840	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	10	Y
890	106051	• DE-ICE WIRE HARNESS	5	Y
905	B-3842-0437	• SPRING PIN, 3/32", CRES	5	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	5	Y
920	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	5	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	5	Y
1140	106935	• SLIP RING ASSEMBLY	1	
1170	A-2070-10	• SCREW, 1/4-28, BUTTON HEAD	10	Y
1300	105558	• BRACKET, WIRE HARNESS	5	
1305	B-3834-0632	• WASHER	20	Y
1315	A-3219-1	• BOLT, 3/8-24, HEX HEAD	5	
1315A	107083	• BOLT, 3/8-24, HEX HEAD ALTERNATE FOR ITEM 1315, POST HC-SL-30-365	5	
1325	A-2246	• SPACER ALUMINUM	5	

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 106049**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106049 and 106818**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>106818</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11CV FIGURES: CV-1 THRU CV-9</b>		
170	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM	5	
190	2H1365	• TAPPED EYELET	10	Y
200	B-3854-41	• WASHER, LOCK	10	Y
210	B-3854-41	• WASHER, LOCK	10	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	10	Y
630	B-3837-0332	• WASHER, CORROSION RESISTANT	10	Y
645	B-3855-32	• DELETED	-	
650	B-3840-7	• SCREW, 10-32, FILLISTER HEAD	5	Y
660	B-3853-F5	• CLAMP, LOOP, PLASTIC	5	Y
840	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	10	Y
890	106051	• DE-ICE WIRE HARNESS	5	Y
905	B-3842-0437	• SPRING PIN, 3/32", CRES	5	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	5	Y
920	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	5	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	5	Y
1140	106935	• SLIP RING ASSEMBLY	1	
1170	A-2070-9	• SCREW, 1/4-28, BUTTON HEAD	10	Y
1300	105558	• BRACKET, WIRE HARNESS	5	
1305	B-3834-0632	• WASHER	20	Y
1315	A-3219-1	• BOLT, 3/8-24, HEX HEAD	5	
1315A	107083	• BOLT, 3/8-24, HEX HEAD ALTERNATE FOR ITEM 1315, POST HC-SL-30-365	5	
1325	A-2246	• SPACER ALUMINUM	5	

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 106818**



This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

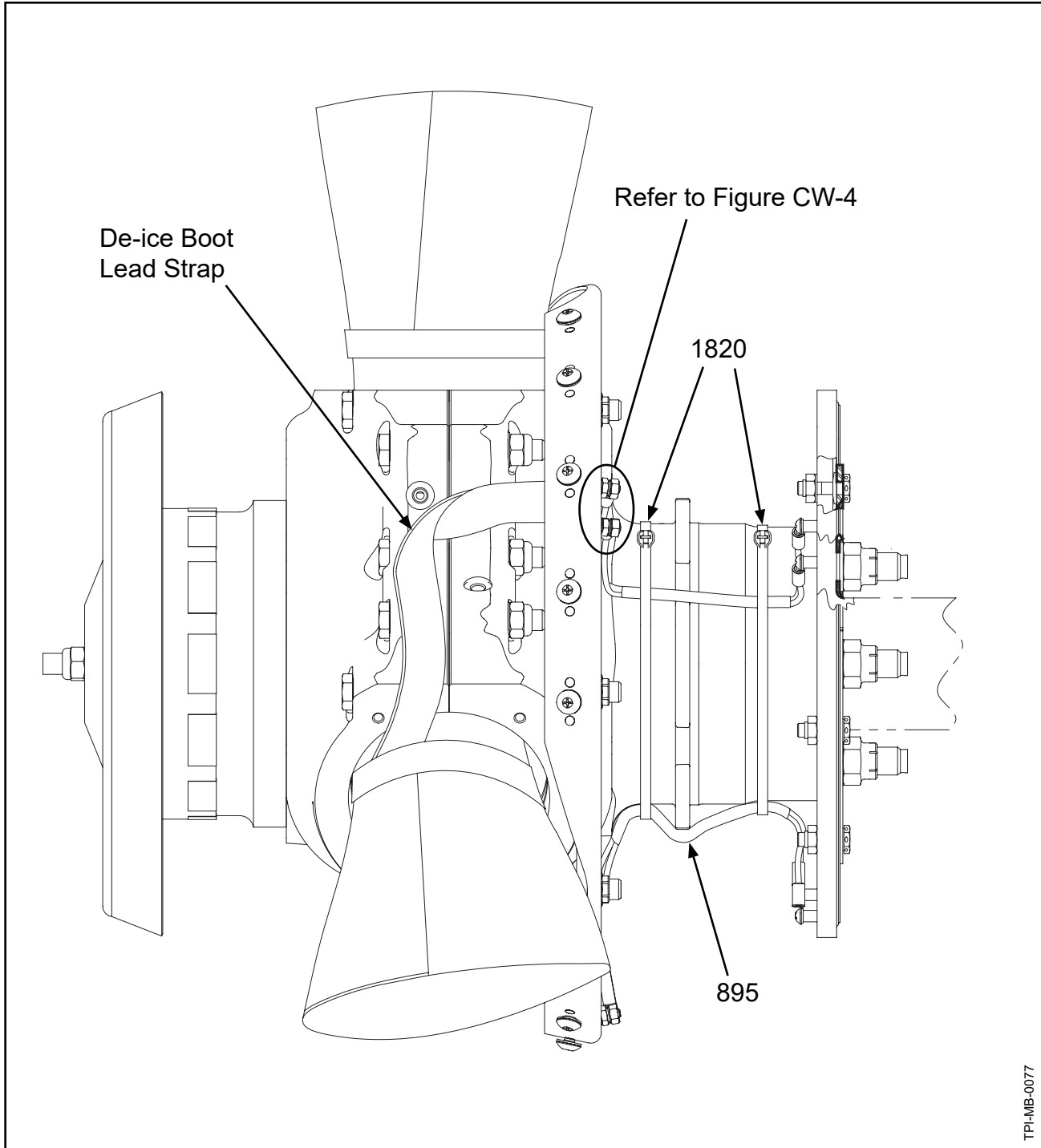
**106111**

CW. Installation Instruction 11CW

- (1) Route the de-ice boot lead strap as shown in Figure CW-1.
- (2) Using screws (350), lead clip (360), washers (370), and nuts (380), secure the de-ice boot lead strap to the bulkhead in accordance with Figure CW-2 and Figure CW-3.
  - (a) Tighten the nut (380) until snug.
- (3) Using screws (270), washers (280), insulating bushings (290), and nuts (300 and 305), connect the de-ice boot lead wires and the slip ring wire harness lead wires that are the same length to the bulkhead in accordance with Figure CW-2 and Figure CW-4.
  - (a) Torque the nut (300) to 6-8 in. lbs. (0.7-0.9 N•m).
  - (b) Torque the nut (305) to 10-12 in. lbs. (1.2-1.3 N•m).
- (4) Connect the staggered leads of the slip ring wire harness (895) to the slip ring in accordance with the Aircraft Maintenance Manual.
- (5) Attach the slip ring wire harness (895) to the hub with the tie straps (1820) as shown in Figure CW-1.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

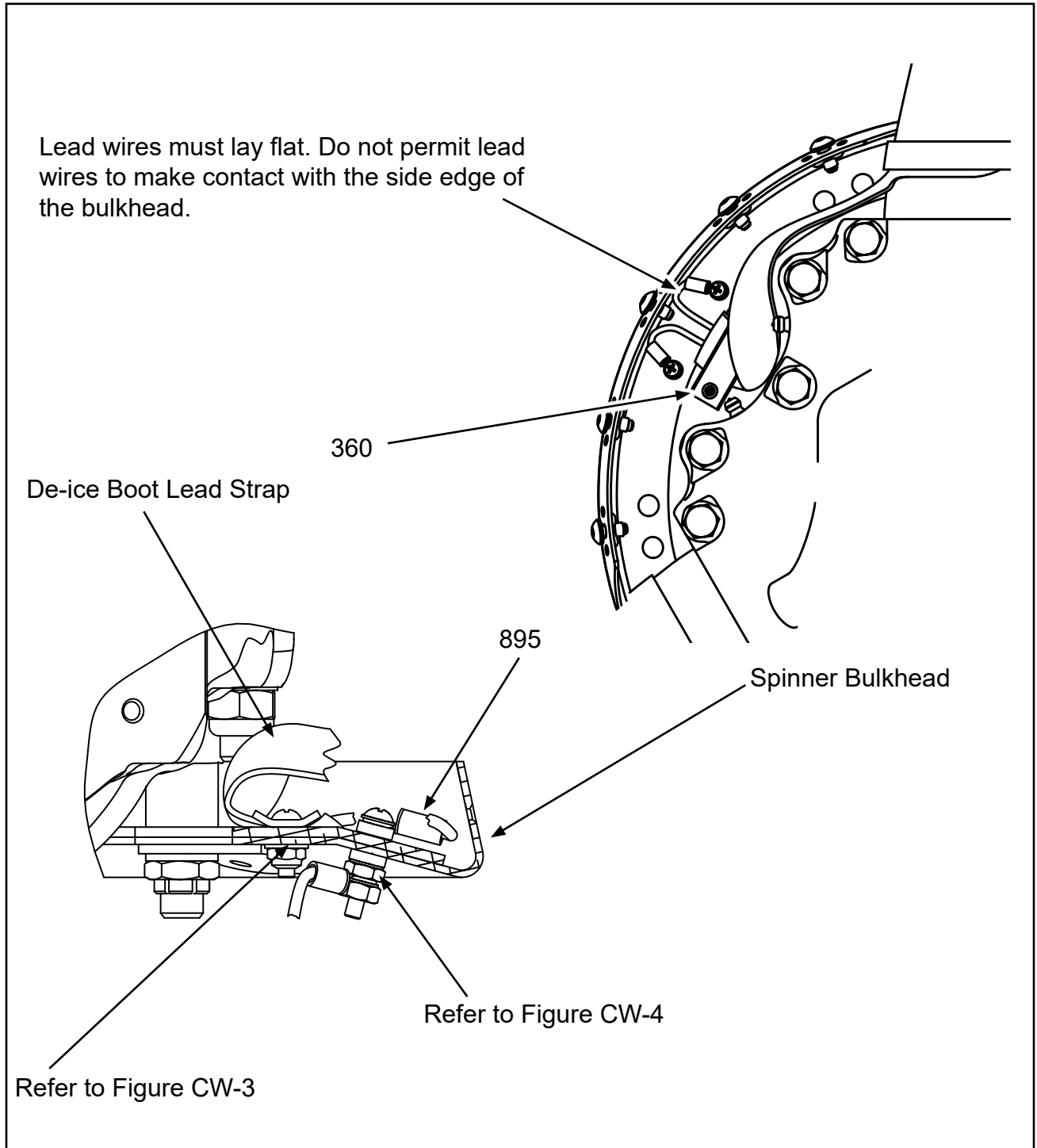
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106111**



**Securing Slip Ring Wire Harness to Hub  
Figure CW-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

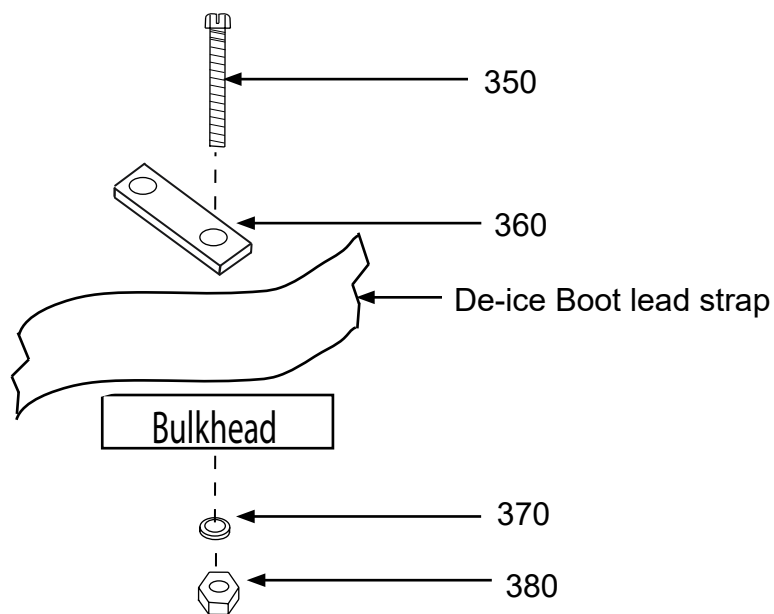
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106111**



**Lead Clip and De-ice Boot Lead Strap and Lead Wire Attachment to Bulkhead  
Figure CW-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

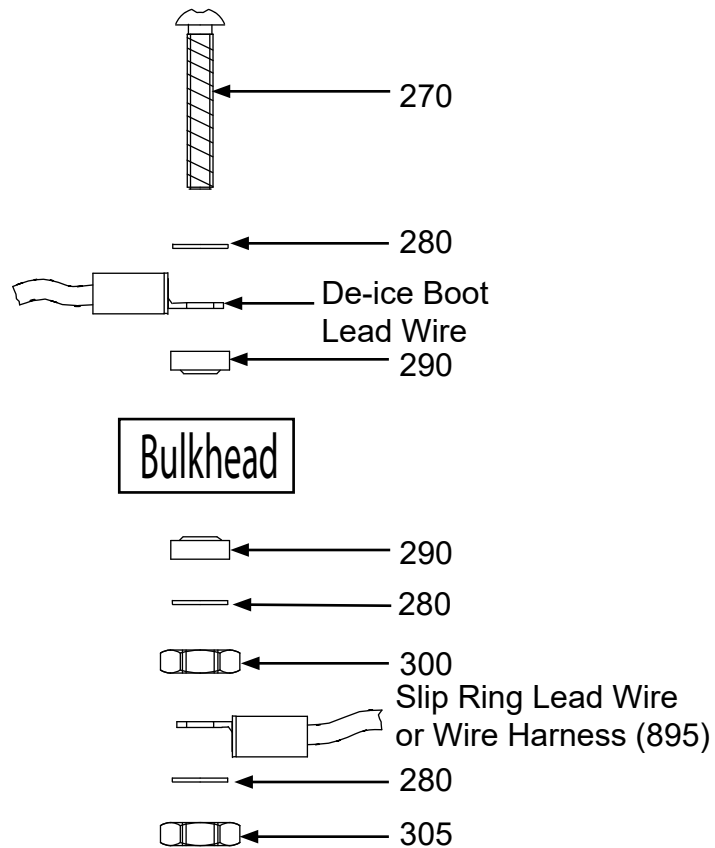
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106111**



**Lead Clip Attachment to Bulkhead  
Figure CW-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106111**



**De-ice Boot Lead Wire and Slip Ring Lead Wire or Wire Harness to Bulkhead  
Figure CW-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106111**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>106111</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11CW</b> <b>FIGURES: CW-1 thru CW-4</b>		
270	B-7035-14	• SCREW, 6-32, PAN HEAD, BRASS	6	
280	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	18	Y
290	2H1260	• BUSHING, INSULATING	12	
300	B-6641-265	• NUT, HEX, BRASS	6	
305	102856-C06	• NUT, HEX, BRASS	6	
350	B-6637-30	• SCREW, PAN HEAD, CRES.	6	
360	3H1271-2	• CLIP, LEAD STRAP	3	
370	B-3837-N632	• WASHER, CORROSION RESISTANT	6	Y
380	B-6655-06	• NUT, HEX, SELF-LOCKING	6	Y
895	106110	• WIRE HARNESS, SLIP RING	3	Y
1820	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	2	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 106111**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106125**

**CX. Installation Instruction 11CX**

- (1) Position the propeller blades at start lock angle.
- (2) Assemble the plug connection between the wire harness (890) and the de-ice boot.
- (3) Install the tie strap (900) around the wire harness/de-ice boot plug connection, but do not tighten at this time.
- (4) Route the terminal end of the wire harness (890) through the hole in the counterweight, as shown in Figure CX-1.
- (5) Install the clear vinyl tubing over the wire harness (890) as shown in Figure CX-1.
- (6) Secure the wire harness/boot connection to the counterweight.
  - (a) Install one tie strap (910) around the counterweight and under the tie strap (900) connecting the wire harness/boot plugs as shown in Figure CX-1. Do not tighten the tie strap at this time.
  - (b) Install one tie strap (910) around the counterweight, under the tie strap (900) connecting the wire harness/boot plugs, and over the clear tubing on the wire harness (890) as shown in Figure CX-1. Do not tighten the tie strap at this time.
  - (c) Position the wire harness/boot plug connection and the heads of the tie straps (910) as shown in Figure CX-1, then tighten the two tie straps (910).
- (7) Install the AMP terminals (975) on the lead wires of the wire harness (890) in accordance with the manufacturer 's instructions.
  - (a) Verify that the AMP terminals (975) are secure.
- (8) Using screw (270), washer (280), insulating bushings (290), and nut (300 and/or 305), connect the de-ice wire harness (890) and the slip ring wire harness (895) to the bulkhead in accordance with Figure CX-2, and Figure CX-3.
  - (a) Torque the nut (300) to 6-8 in. lbs. (0.7-0.9 N•m) and nut (305) 10-12 in-lbs. (1.2-1.3 N•m).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106125**

**CX.**    Installation Instruction 11CX - continued

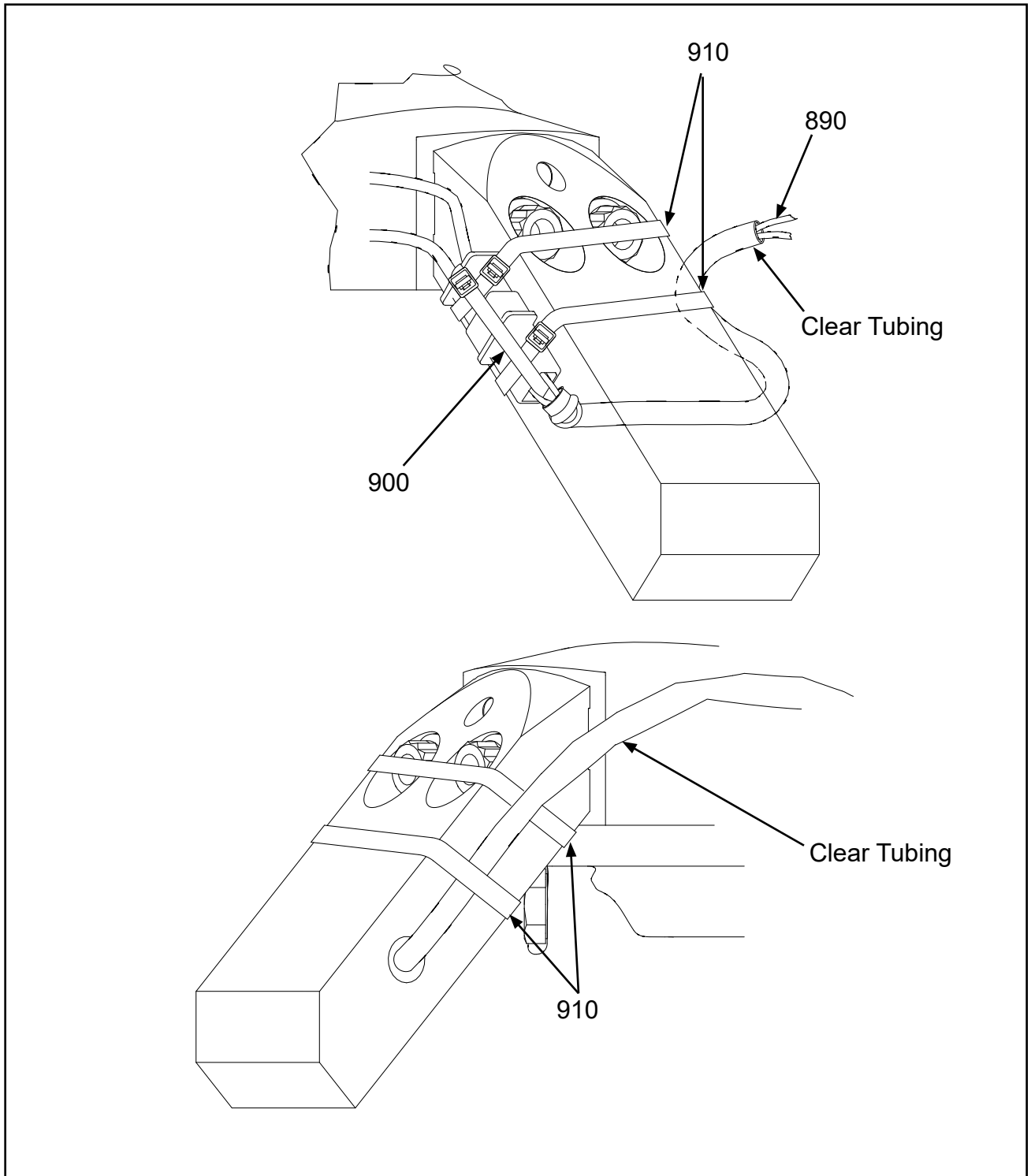
- (9) Using the lead clip (360), screw (350), washer (370) and nut (380), route the de-ice wire harness (890) as shown and attach to the bulkhead in accordance with Figure CX-4 and Figure CX-5.
  - (a) Make sure that the lead clip (360) is installed over the clear tubing on the de-ice wire harness (890).
  - (b) Tighten the screw (350) until snug.
- (10) Cycle the propeller from start lock angle to high angle to verify proper wire harness installation. Make sure wire harness is not obstructed during cycling.
- (11) Connect the slip ring wire harness (895) to the starter ring gear/slip ring in accordance with Figure CX-6.
- (12) Secure the slip ring wire harness (895) to the hub using the tie strap (930) as shown in Figure CX-6.



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106125**

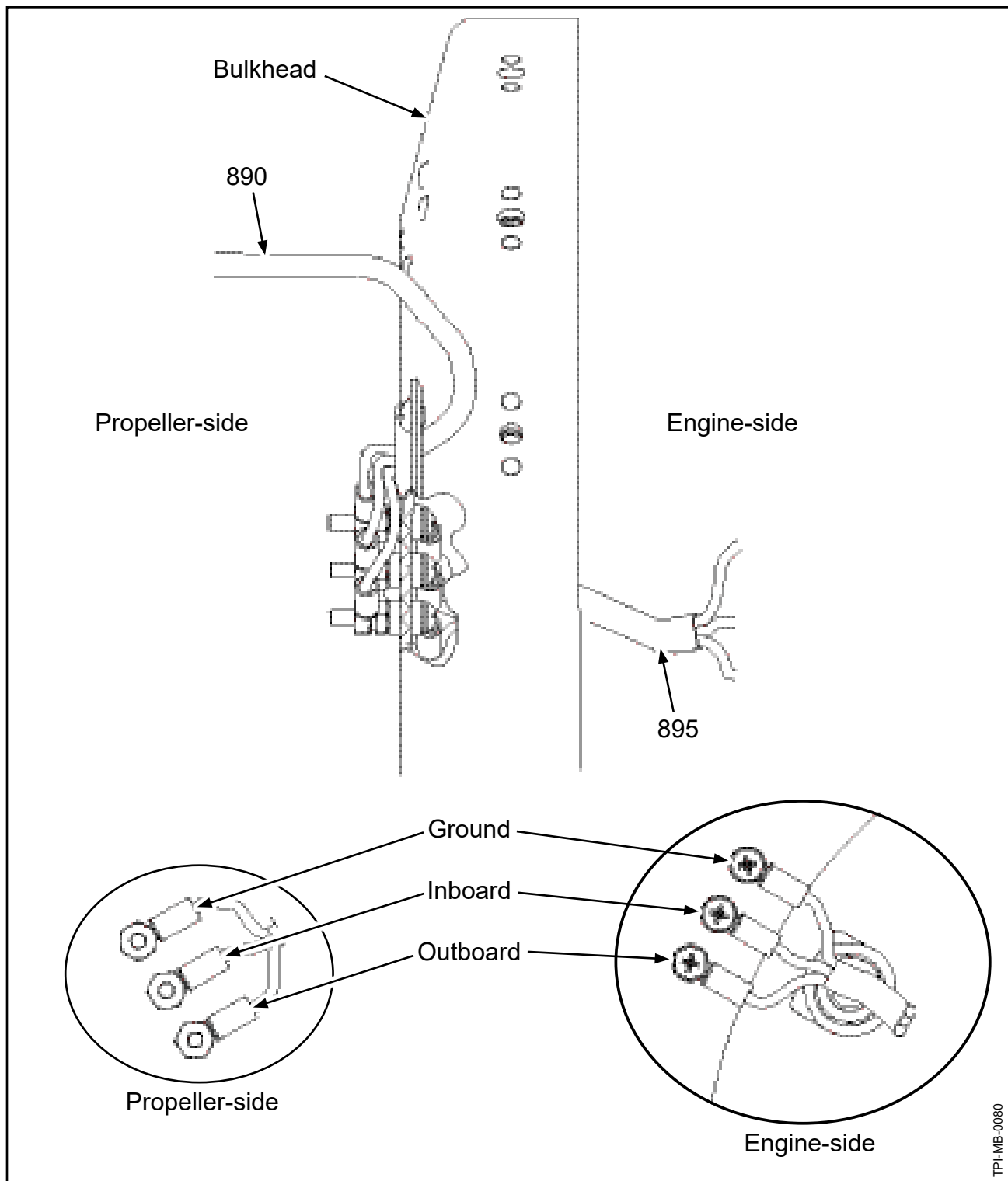


**Wire Harness to Counterweight Attachment  
Figure CX-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106125**

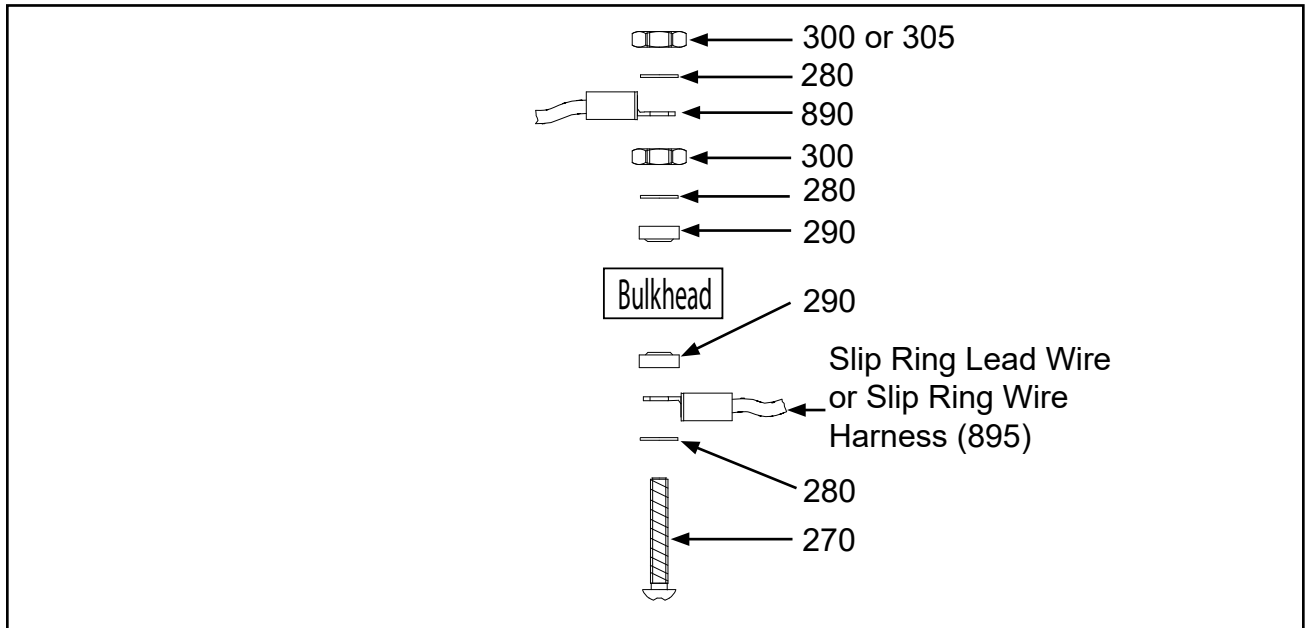


**De-ice Wire Harness Routing  
Figure CX-2**

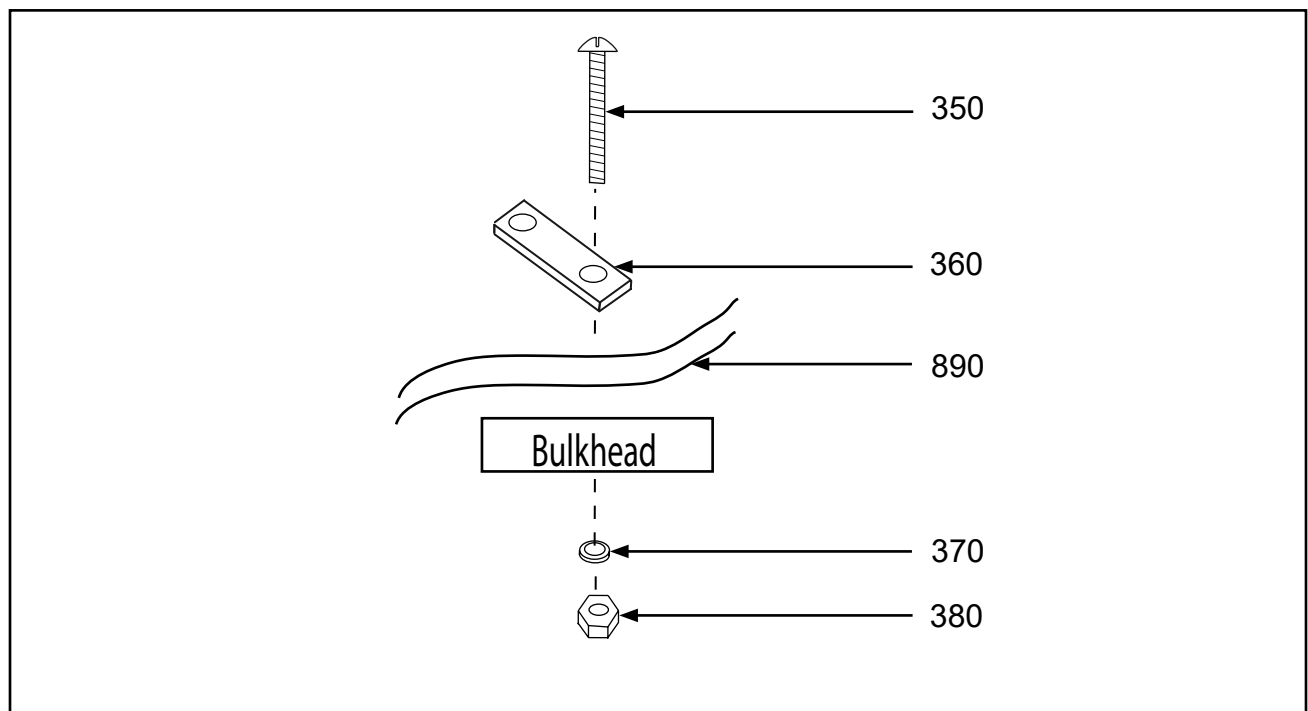
# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions for the following electric de-ice kit(s):

**106125**



**Securing De-ice Wire Harness and Slip Ring Lead Wire to Bulkhead  
Figure CX-3**

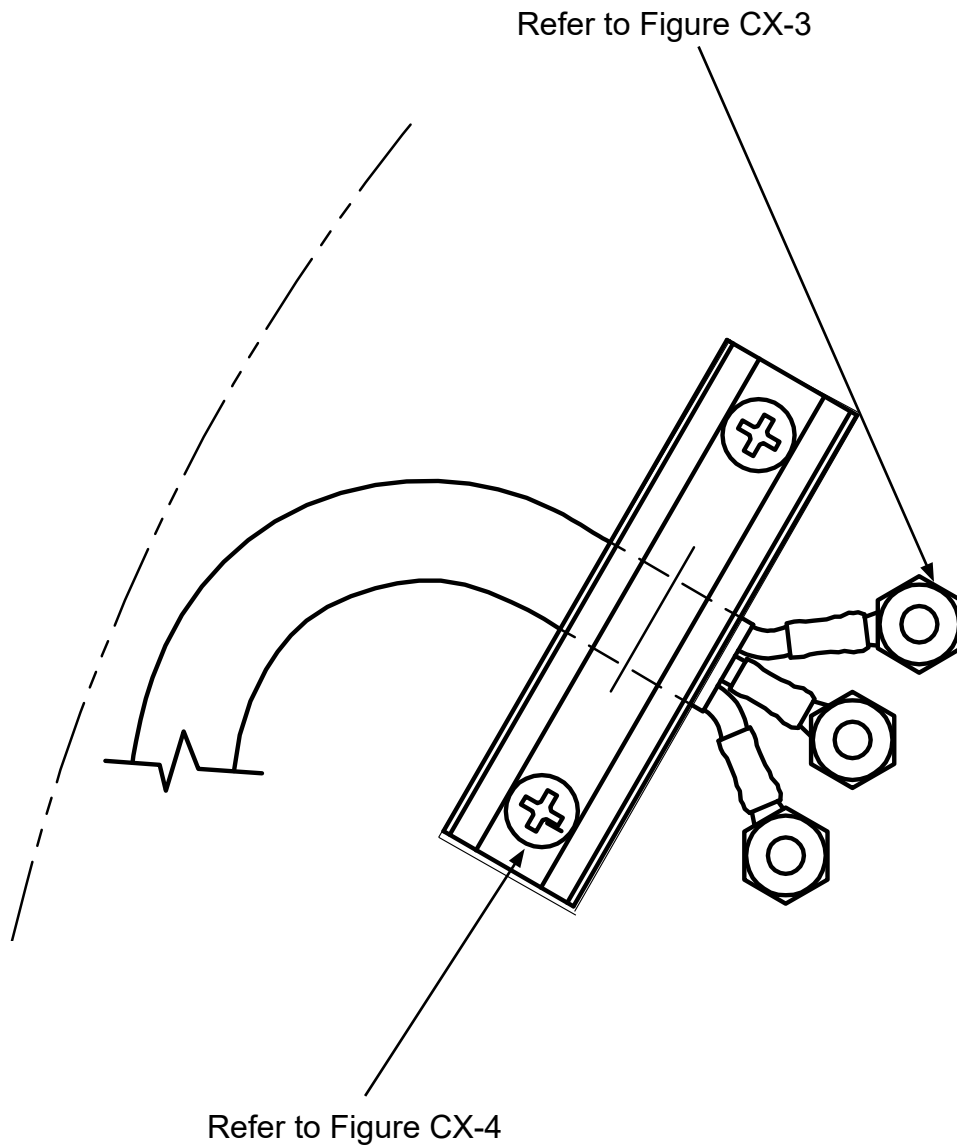


**Lead Clip Attachment to Bulkhead  
Figure CX-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106125**

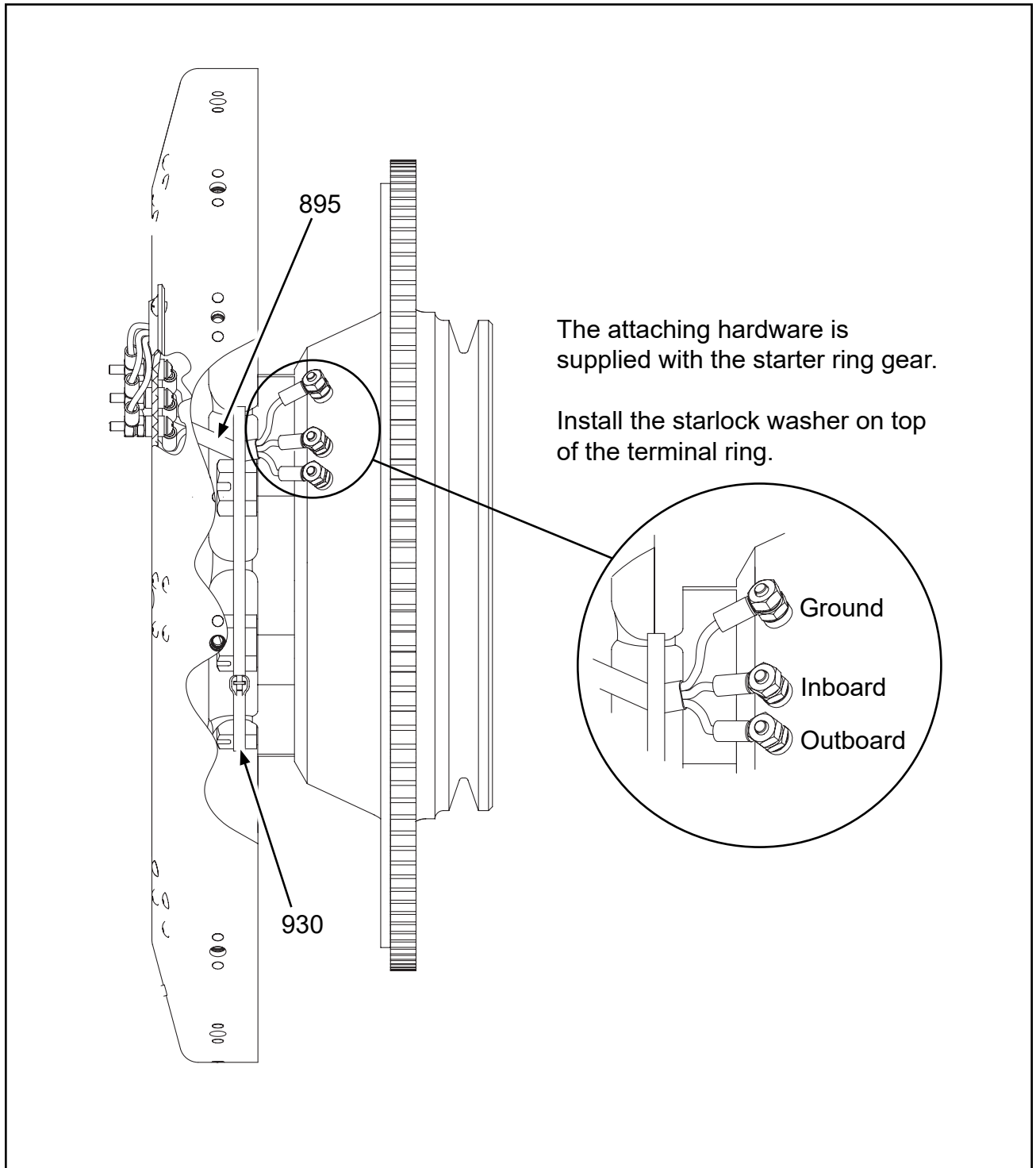


Lead wires may have two or 3 terminal ends.

**De-ice Wire Harness Routing  
Figure CX-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106125**



**Tie Straps Holding Slip Ring Wire Harness to Hub  
Figure CX-6**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106125**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>106125</b>	<b>PROPELLER DE-ICE KIT INSTALLATION INSTRUCTION 11CX FIGURES: CX-1 THRU CX-6</b>		
270	B-7035-14	• SCREW, 6-32, PAN HEAD, BRASS	9	
280	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	27	Y
290	2H1260	• INSULATING BUSHING	18	
300	B-6641-265	• NUT, HEX, BRASS	9	
305	102856-C06	• NUT, SELF-LOCKING, THIN, CRES	9	
350	B-6637-30	• SCREW, PAN HEAD, CRES	6	
360	3H1271-2	• CLIP, LEAD STRAP	3	
370	B-3837-N632	• WASHER, CORROSION RESISTANT	6	Y
380	B-6655-06	• NUT, HEX, SELF-LOCKING	6	Y
890	4H1967-3	• WIRE HARNESS - KIT	3	Y
900	B-3825-1-0	• • TIE STRAP	1	
910	B-3852-2-0	• • TIE STRAP	2	
975	320619	• • AMP 320619 PIDG RING TERMINAL	3	
	MIL-I-7444	• • CLEAR VINYL TUBING		
895	106126	• WIRE HARNESS, SLIP RING	3	Y
930	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	1	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 106125**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106285 and 107597**

**CY. Installation Instruction 11CY**

- (1) Using the screw (220), washers (200 and 210), tapped eyelet (190), attach the terminal strip (170) to the bulkhead in accordance with Figure CY-1.
  - (a) Torque the screw (220) to 10-12 In-Lb (1.2-1.3 N•m).
- (2) Using the screws (1170), attach the slip ring (1140) and the bulkhead to the hub as shown in Figure CY-2.
  - (a) Torque each screw (1170) 8-10 Ft-Lb (10.9-13.5 N•m).
- (3) Complete a slip ring run-out check in accordance with the Check chapter of this manual.
- (4) Put the propeller blades at reverse blade angle.
- (5) If required, press the spring pin (905) perpendicularly into the hole in the counterweight as shown in Figure CY-3.
  - (a) The spring pin (905) must extend to a height of 0.170-0.210 inch (4.32-5.33 mm).

**NOTE:** The counterweight may have been drilled for the spring pin (905) or may have an integral (cast) pin in place of the spring pin.

- (6) Assemble the plug connection between the wire harness (890) and the de-ice boot.
- (7) Install the wire harness/de-ice boot plug connections in the groove in the counterweight against the spring pin (905) or integral cast pin as shown in Figure CY-4.
- (8) Install the tie strap (910) in the retaining grooves of the counterweight and around the counterweight and between the wires of the wire harness/de-ice boot plug connection as shown in Figure CY-4.

**CAUTION:** ROUTING THE TIE STRAP (910) INCORRECTLY CAN CAUSE AN ELECTRICAL SHORT IN THE DE-ICE SYSTEM.

- (a) On the boot-side of the plug connection: install the tie strap (910) between wire 2 and wire 3 as shown in Figure CY-4.
- (b) On the wire harness-side of the plug connection: install the tie strap (910) between wire 1 and wire 2 as shown in Figure CY-4.
- (c) Position the head of tie strap (910) in approximate location shown in Figure CY-4.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106285 and 107597**

**CY.**    Installation Instruction 11CY - continued

- (9) Using the tie strap (930), secure the de-ice boot lead wires to the tie strap (910) as shown in Figure CY-4.
- (10) Install the tie strap (920) around the blade shank and over the de-ice boot lead wires as shown in Figure CY-4.
  - (a) The head of tie strap (920) must be located at the trailing edge of the blade as shown in Figure CY-5.
- (11) Install the clamp (660), around the wire harness (890) and position it against the O-ring as shown in Figure CY-6.
- (12) Apply threadlocker CM399 to the threads of the screw (650).
- (13) Using screw (650) and washers (630), install the clamp (660) to the counterweight in accordance with Figure CY-6.
  - (a) Align the clamp (660) so that there is  $0.07 \pm 0.01$  inch ( $1.8 \pm 0.2$  mm) clearance between the O-ring and the hub as shown in Figure CY-6.
  - (b) Torque the screw (650) to 20-22 In-Lb (2.3-2.4 N•m).
- (14) Install the wire harness bracket (1300), washers (1305), existing hub clamping washer, and existing hub clamping nut onto the the hub clamping bolt (1315) in accordance with Figure CY-7.
  - (a) Position the wire harness bracket (1300) with the centerline directed toward the ground ("GND") slip ring lead wire as shown in Figure CY-8.
  - (b) Torque the hub clamping nut to 20-22 Ft-Lb (28-29 N•m).
    - 1    A minimum of one thread must be visible above the hub clamping nut after it is torqued.
- (15) Put the wire harness (890) on the wire harness bracket (1300) with the O-ring off of the edge of the bracket as shown in Figure CY-8.

**CAUTION:**    TWISTING OF THE LEAD WIRES BETWEEN THE CLAMP (660) AND THE WIRE HARNESS BRACKET (1300) IS NOT PERMITTED.

- (a) Attach the wire harness (890) to the wire harness bracket (1300) with two tie straps (840) as shown in Figure CY-8.
- (16) Route the wire harness (890) under the inboard ("INBD") slip ring lead wire and over the outboard ("OUTBD") and ground ("GND") slip ring lead wires as shown in Figure CY-8.



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

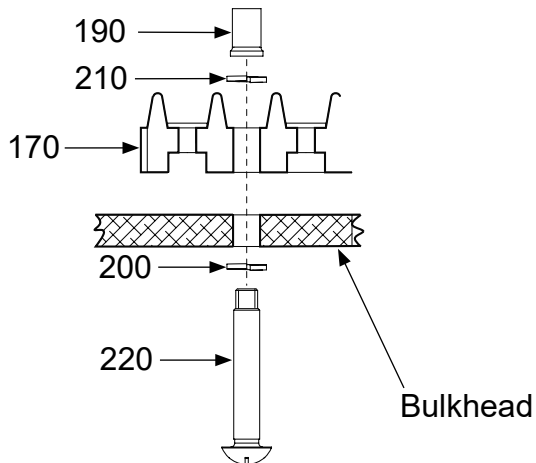
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106285 and 107597**

CY. Installation Instruction 11CY - continued

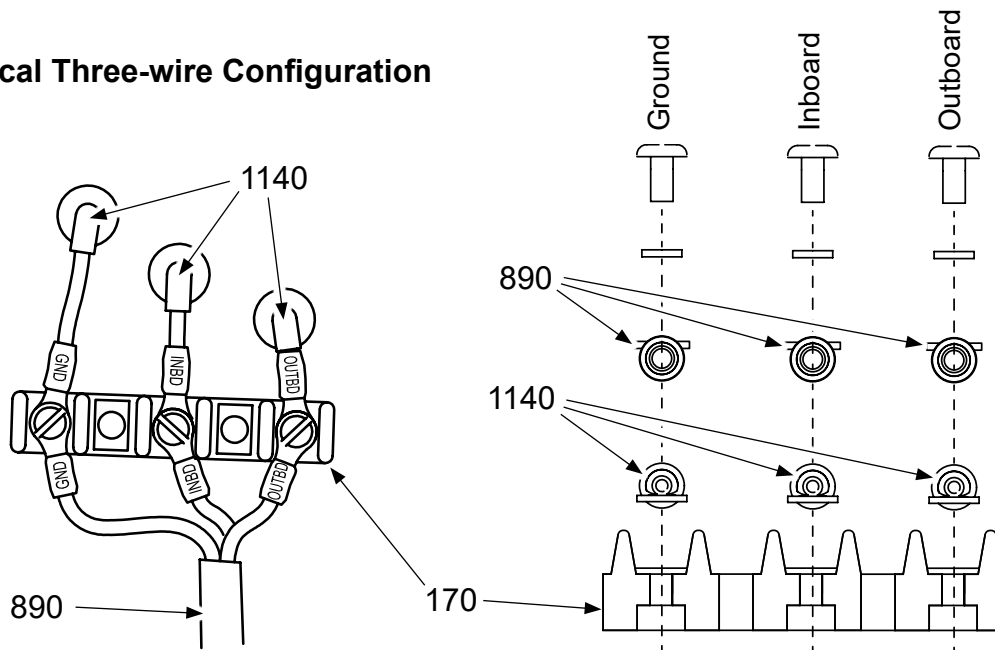
- (17) Attach the lead wires from the slip ring (1140) and the lead wires from the wire harness (890) to the terminal strip (170) in accordance with Figure CY-1 and Figure CY-8.
  - (a) Using one tie strap (930), attach the lead wires from the wire harness (890) to the ground ("GND") slip ring lead wire as shown in Figure CY-8.
  - (b) Tighten the terminal strip screws until snug.
- (18) Cycle the propeller blades from reverse angle to feather angle to verify proper wire harness installation. Make sure the wire harness is not blocked during cycling.

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions for the following electric de-ice kit(s):  
**106285 and 107597**



## Typical Three-wire Configuration



**NOTE:** The illustrations show slip ring wires on a typical right-hand (rotation) propeller.

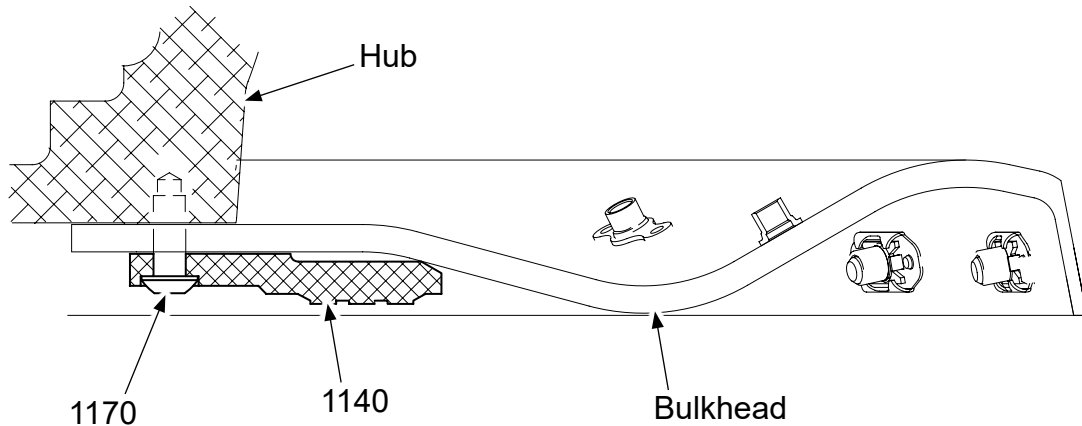
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**Terminal Strip Hardware Configuration: Bulkhead Mounted**  
**Figure CY-1**

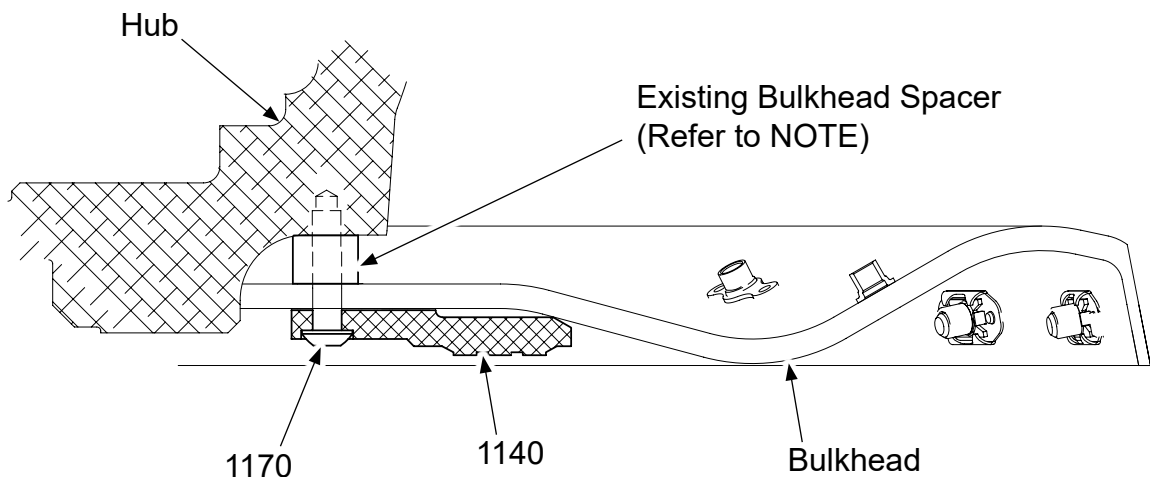
**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106285 and 107597**

**Typical Slip Ring Installation (without bulkhead spacer)**



**Typical Slip Ring Installation (with bulkhead spacer)**



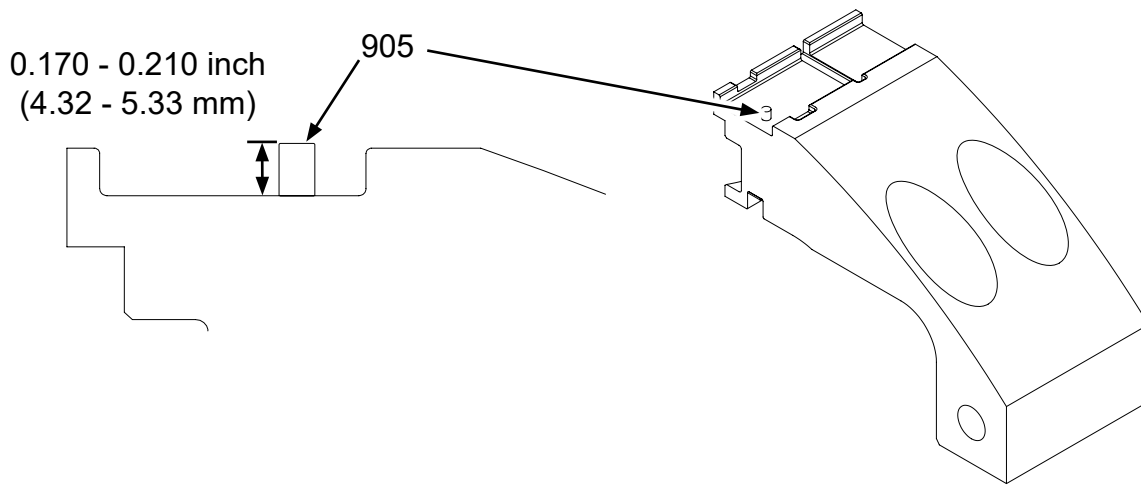
**NOTE:** The bulkhead spacer is a spinner mounting component and is application specific. Refer to Hartzell Propeller Application Guide Manual 159 (61-02-59).

TPI-MB-0204, TPI-MB-0223

**Slip Ring Mounting  
Figure CY-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106285 and 107597**

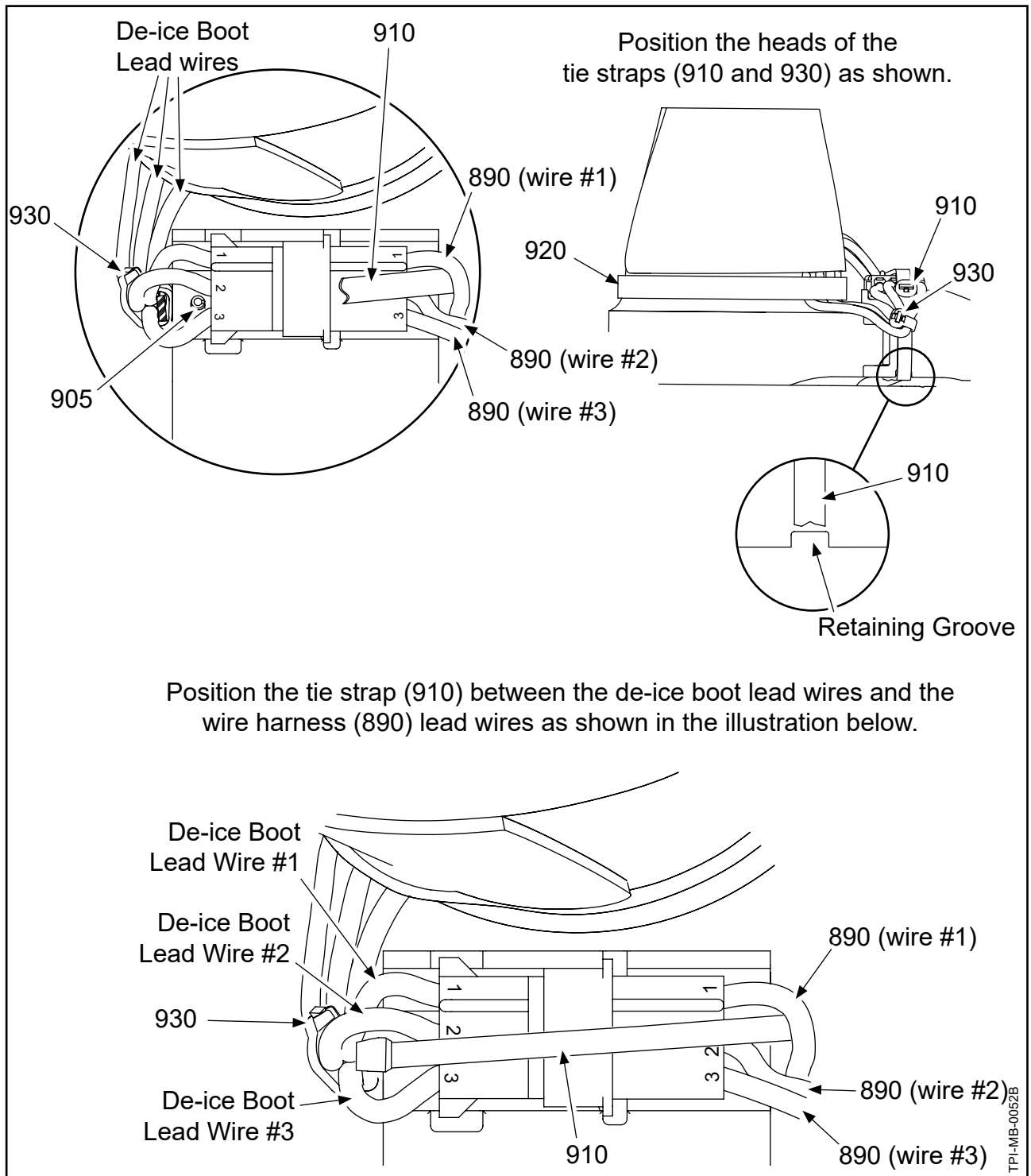


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**Spring Pin Height  
Figure CY-3**

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

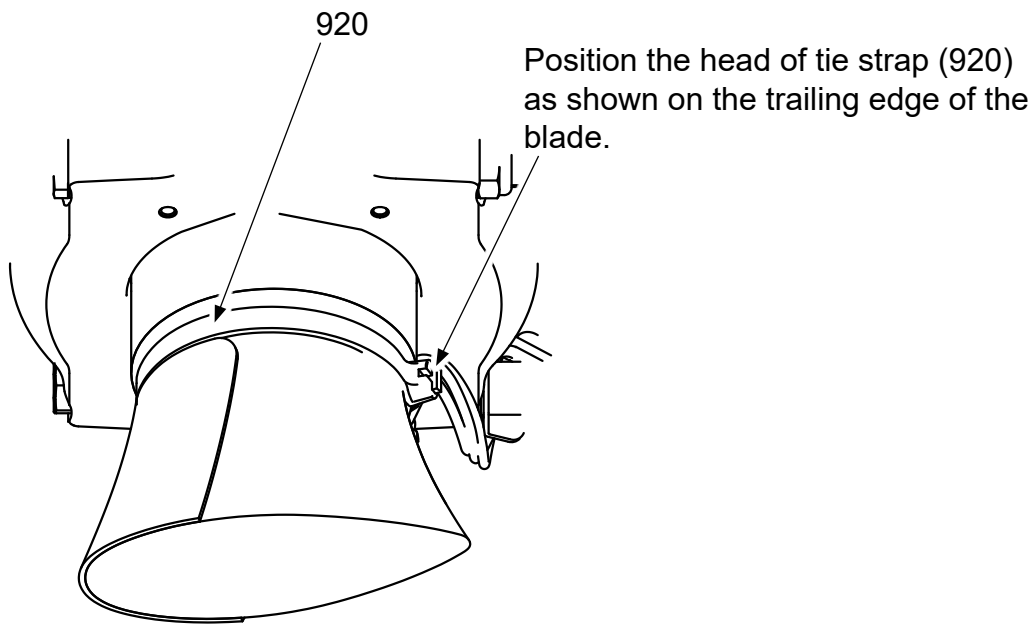
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106285 and 107597**



**Wire Harness to Blade Shank/Counterweight**  
**Figure CY-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106285 and 107597**

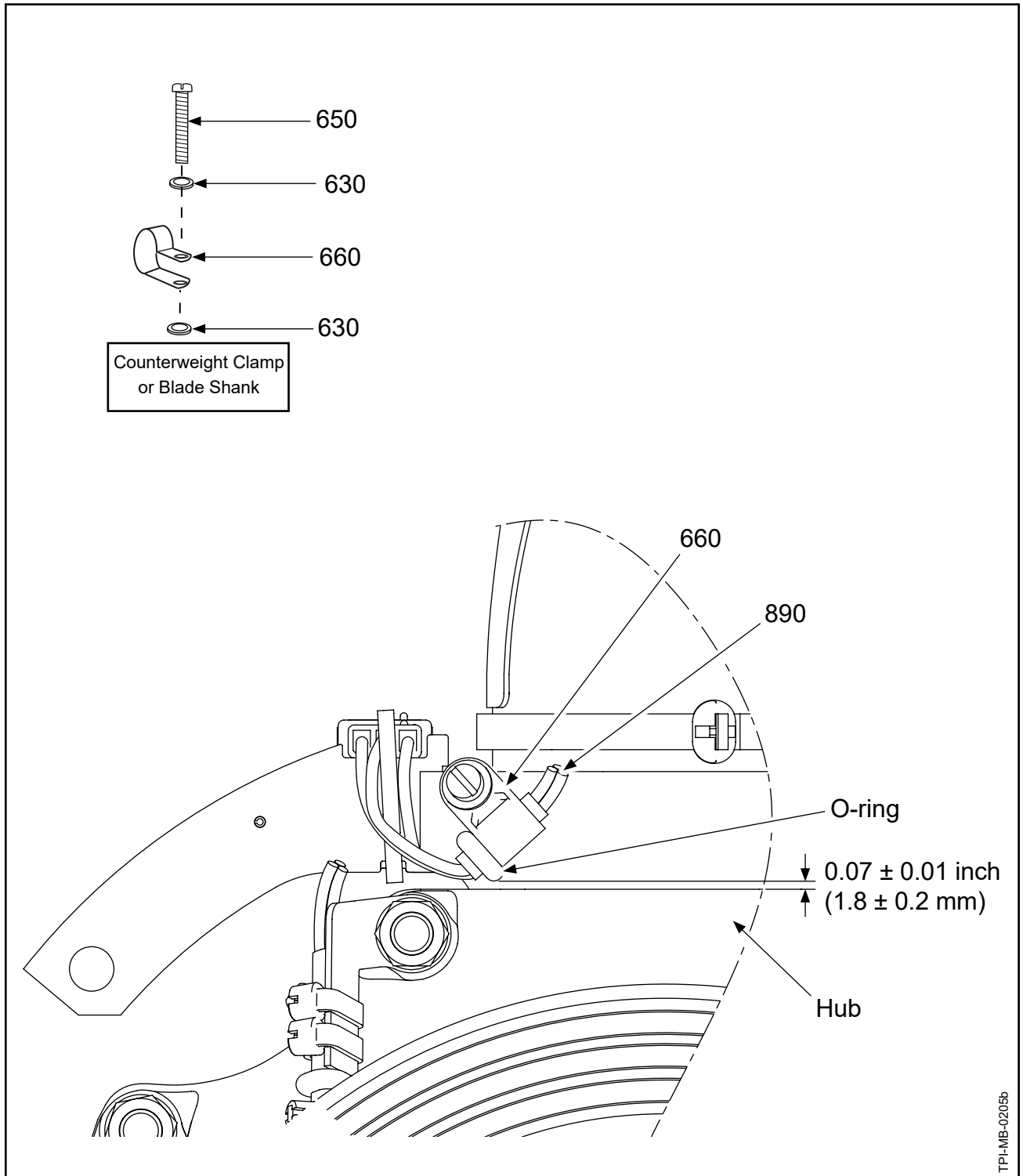


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**Wire Harness to Blade Shank  
Figure CY-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

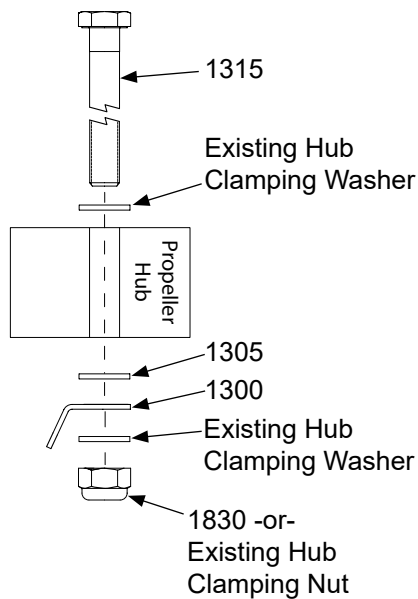
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106285 and 107597**



**Loop Clamp Orientation  
Figure CY-6**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106285 and 107597**

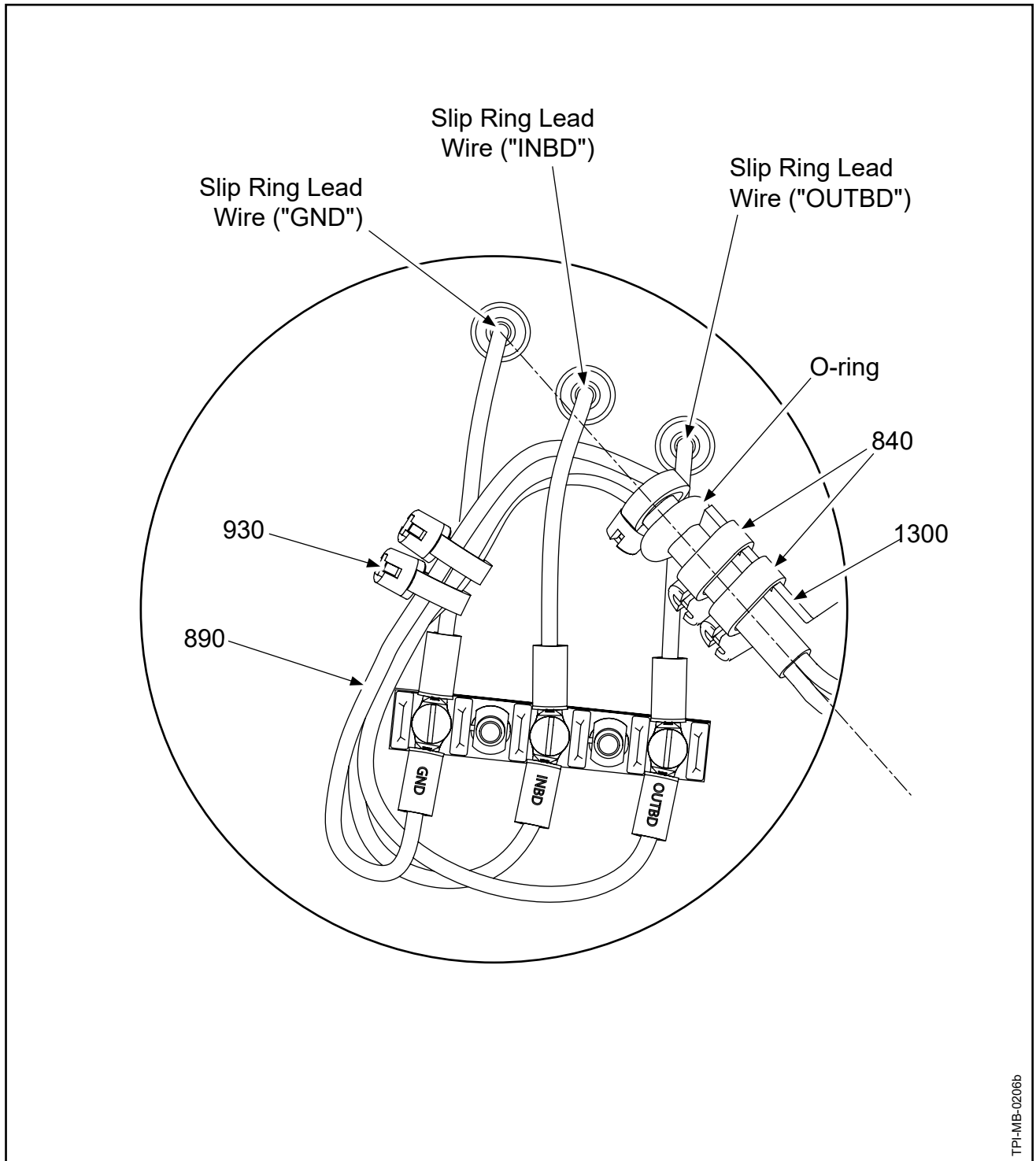


**Wire Harness Bracket Hardware Configuration  
Figure CY-7**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106285 and 107597**



**Wire Harness Bracket Alignment  
Figure CY-8**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106285 and 107597**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>106285</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11CY</b> <b>FIGURES: CY-1 thru CY-8</b>		
170	1H1150-2	• TERMINAL STRIP	5	
190	2H1365	• TAPPED EYELET	10	Y
200	B-3854-41	• WASHER, LOCK	10	Y
210	B-3854-41	• WASHER, LOCK	10	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	10	Y
630	B-3837-0332	• WASHER, CORROSION RESISTANT	10	Y
645	B-3855-32	• DELETED	-	
650	B-3840-7	• SCREW, 10-32, FILLISTER HEAD	5	Y
660	B-3853-F5	• CLAMP, LOOP, PLASTIC	5	Y
840	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	10	Y
890	105066	• WIRE HARNESS REPLACED BY ITEM 890A, PRE HC-SB-30-375	5	Y
890A	105555	• WIRE HARNESS REPLACES ITEM 890, POST HC-SB-30-375	5	Y
905	B-3842-0437	• SPRING PIN, 3/32", CRES	5	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	5	Y
920	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	5	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	10	Y
1140	105925	• SLIP RING ASSEMBLY	1	
1170	A-2070-6	• SCREW, 1/4-28, BUTTON HEAD	10	Y
1300	105558	• BRACKET, WIRE HARNESS	5	
1305	B-3834-0663	• WASHER	5	Y
1315	102691	• BOLT, 3/8-24, HEX HEAD	5	

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 106285**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106285 and 107597**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>107597</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11CY</b> <b>FIGURES: CY-1 thru CY-8</b>		
170	1H1150-2	• TERMINAL STRIP	5	
190	2H1365	• TAPPED EYELET	10	Y
200	B-3854-41	• WASHER, LOCK	10	Y
210	B-3854-41	• WASHER, LOCK	10	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	10	Y
630	B-3837-0332	• WASHER, CORROSION RESISTANT	10	Y
645	B-3855-32	• DELETED	-	
650	B-3840-7	• SCREW, 10-32, FILLISTER HEAD	5	Y
660	B-3853-F5	• CLAMP, LOOP, PLASTIC	5	Y
840	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	10	Y
890	105555	• WIRE HARNESS	5	Y
905	B-3842-0437	• SPRING PIN, 3/32", CRES	5	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	5	Y
920	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	5	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	10	Y
1140	107601	• SLIP RING ASSEMBLY	1	
1170	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	10	Y
1300	105558	• BRACKET, WIRE HARNESS	5	
1305	B-3834-0663	• WASHER	5	Y
1315	102691	• BOLT, 3/8-24, HEX HEAD	5	

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 107597**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106285 and 107597**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106783**

**CZ. Installation Instruction 11CZ**

- (1) Using the screw (220), washers (200 and 210), tapped eyelet (190), attach the terminal strip (170) to the bulkhead in accordance with Figure CZ-1.
  - (a) Torque the screw (220) to 10-12 In-Lbs (1.2-1.3 N•m).
- (2) Using the screws (1170) and the existing bulkhead spacers, attach the slip ring (1140) and the bulkhead to the hub in accordance with Figure CZ-2.
  - (a) Torque each screw (1170) to 8-10 Ft-Lbs (10.9-13.5 N•m).
  - (b) Wait five minutes after torquing the screws (1170), then re-torque each screw (1170) to 8-10 Ft-Lbs (10.9-13.5 N•m).
- (3) Do a slip ring run-out check in accordance with the Check chapter of this manual.
- (4) Set the propeller blades at reverse blade angle.
- (5) If required, press the spring pin (905) perpendicularly into the hole in the counterweight as shown in Figure CZ-3.
  - (a) The spring pin (905) must extend to a height of 0.170 - 0.210 inch (4.32-5.33 mm).

**NOTE:** The counterweight could have been drilled for the spring pin (905) or it could have an integral (cast) pin instead of a spring pin.

- (6) Assemble the plug connection between the wire harness (890) and the de-ice boot.
- (7) Install the wire harness/de-ice boot plug connections in the groove in the counterweight against the spring pin (905) or integral cast pin as shown in Figure CZ-4.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106783**

**CZ.**    Installation Instruction 11CZ - continued

- (8) Install the tie strap (910) in the retaining grooves of the counterweight and around the counterweight and between the wires of the wire harness/de-ice boot plug connection.

**CAUTION:**    ROUTING THE TIE STRAP (910) INCORRECTLY CAN CAUSE  
AN ELECTRICAL SHORT IN THE DE-ICE SYSTEM.

- (a) On the de-ice boot-side of the plug connection, install the tie strap (910) between wire 1 and wire 2 as shown in Figure CZ-4.
  - (b) On the wire harness-side of the plug connection, install the tie strap (910) between wire 2 and wire 3 as shown in Figure CZ-4.
  - (c) Put the head of the tie strap (910) in the approximate location shown in Figure CZ-4.
- (9) Using the tie strap (930), attach the de-ice boot lead wires to the tie strap (910) as shown in Figure CZ-4.
- (10) Install the tie strap (920) around the blade shank and over the de-ice boot lead wires as shown in Figure CZ-4.
- (a) The head of tie strap (920) must be located at the trailing edge of the blade as shown in Figure CZ-4.
- (11) Install the clamp (660), around the wire harness (890) and put it against the O-ring as shown in Figure CZ-5.
- (12) Install the clamp (660) onto the counterweight.
- (a) Put the centerline of the clamp (660) parallel to the hub surface as shown in Figure CZ-5.
  - (b) Apply threadlocker CM399 to the threads of the screw (650).
  - (c) Using screw (650) and washers (630), install the clamp (660) to the counterweight in accordance with Figure CZ-6.
- 1    Torque the screw (650) to 20-22 In-Lbs (2.3-2.4 N•m).
- (13) Install the washers (1305), wire harness bracket (1300), existing hub clamping washer, and existing hub clamping nut onto the the hub clamping bolt (1315) in accordance with Figure CZ-7.
- (a) Put the long edge of wire harness bracket (1300) parallel to the blade centerline as shown in Figure CZ-8.
  - (b) Torque the hub clamping nut to 20-22 Ft-Lbs (27.2-29.8 N•m).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

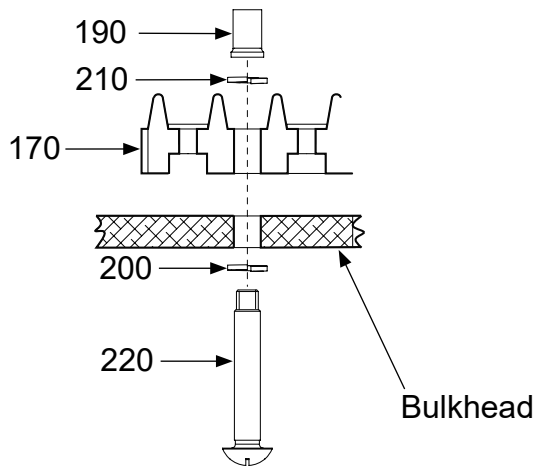
**106783**

**CZ.**    Installation Instruction 11CZ - continued

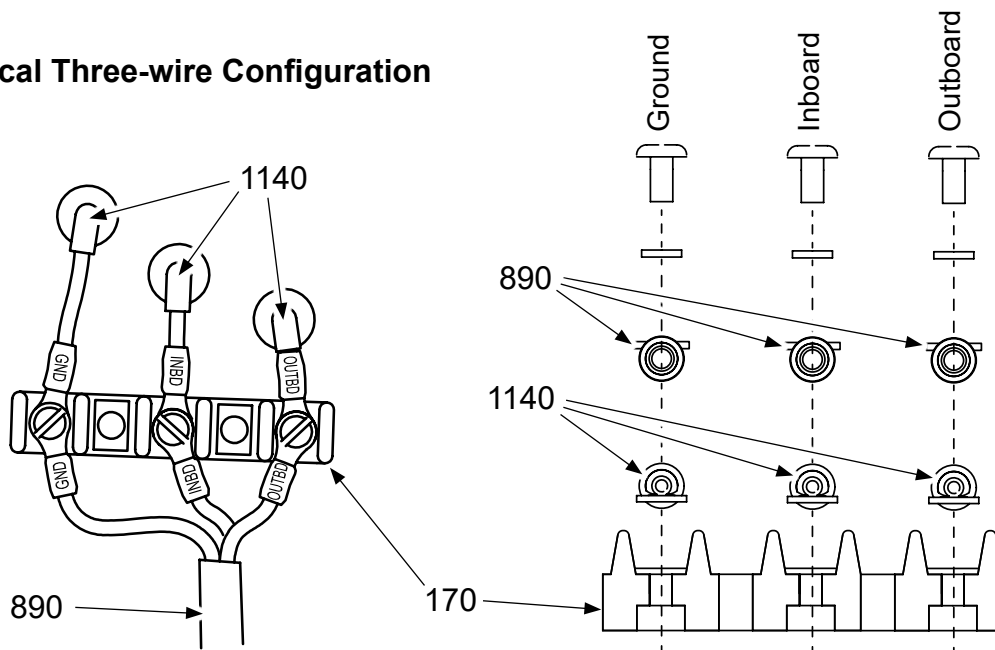
- (14) Attach the wire harness (890) to the wire harness bracket (1300) as shown in Figure CZ-8.
  - (a) Position the wire harness (890) with the O-ring on top of the bracket (1300) as shown in Figure CZ-9.
  - (b) Attach the wire harness (890) to the bracket (1300) with two tie straps (840). Twisting of the lead wires is not permitted.
  - (c) Position the heads of the tie straps (840) as shown in Figure CZ-8.
- (15) Install the slip ring lead wires and de-ice wire harness (890) to the terminal strip (170) in accordance with Figure CZ-1.
- (16) Tighten the terminal screws until snug.
- (17) Cycle the propeller blades from reverse angle to feather angle to make sure of proper wire harness installation. Make sure the wire harness is not blocked during cycling.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106783**



**Typical Three-wire Configuration**



**NOTE:** The illustrations show slip ring wires on a typical right-hand (rotation) propeller.

**Terminal Strip: Bulkhead Mounted  
Figure CZ-1**

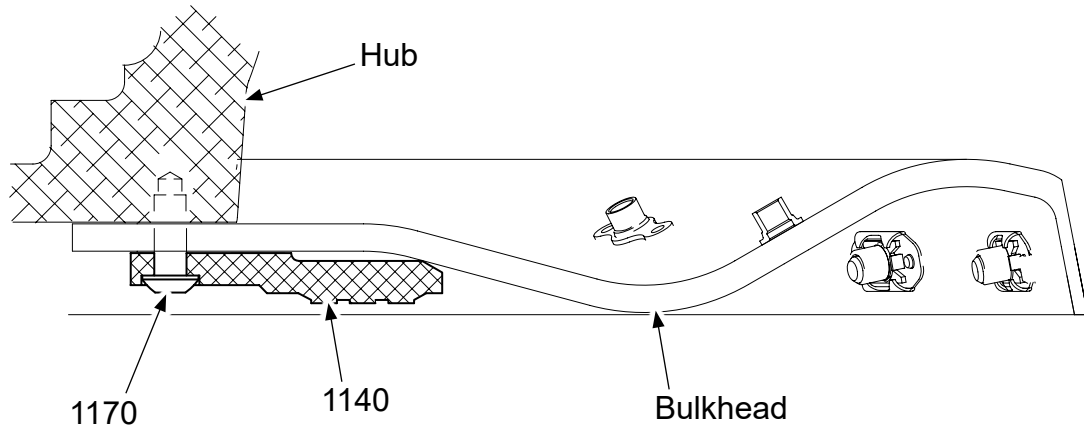


**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

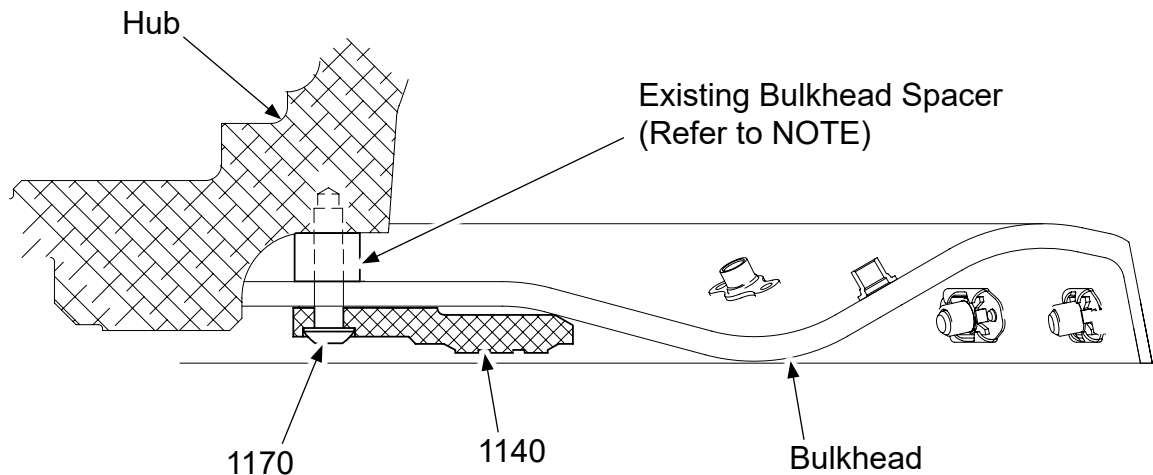
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106783**

**Typical Slip Ring Installation (without bulkhead spacer)**



**Typical Slip Ring Installation (with bulkhead spacer)**



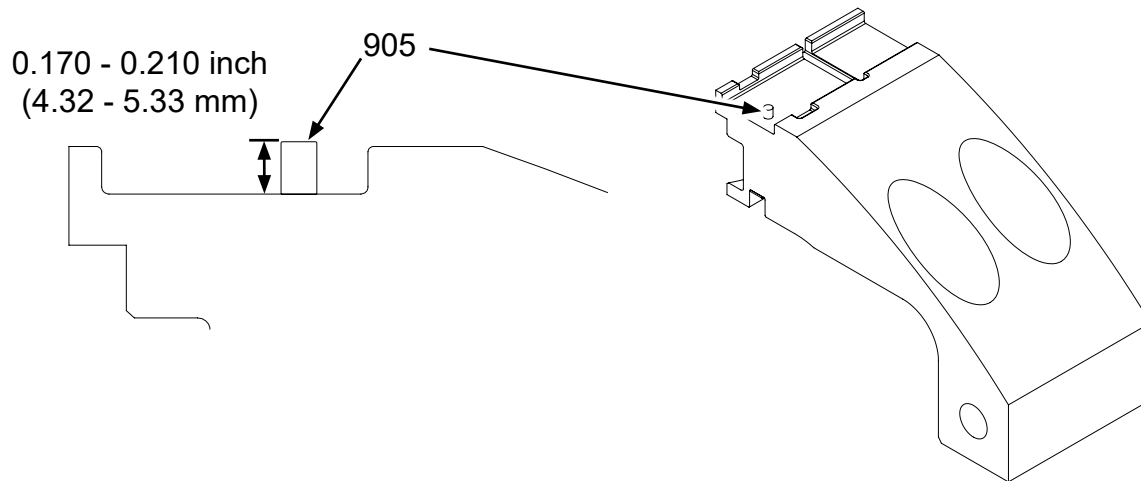
**NOTE:** The bulkhead spacer is a spinner mounting component and is application specific. Refer to Hartzell Propeller Application Guide Manual 159 (61-02-59).

TPI-MB-0204, TPI-MB-0223

**Slip Ring Mounting  
Figure CZ-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106783**

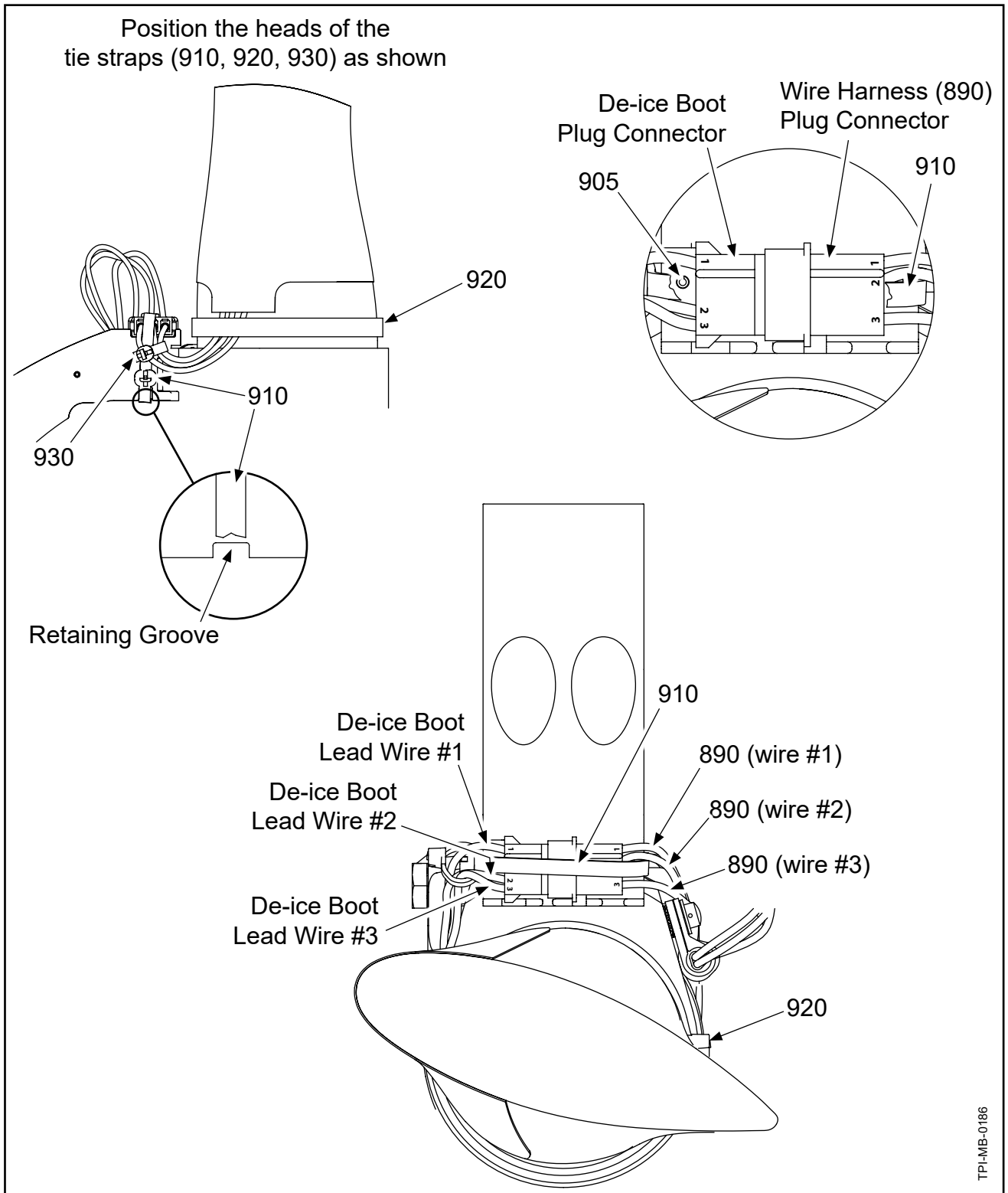


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**Spring Pin Height  
Figure CZ-3**

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

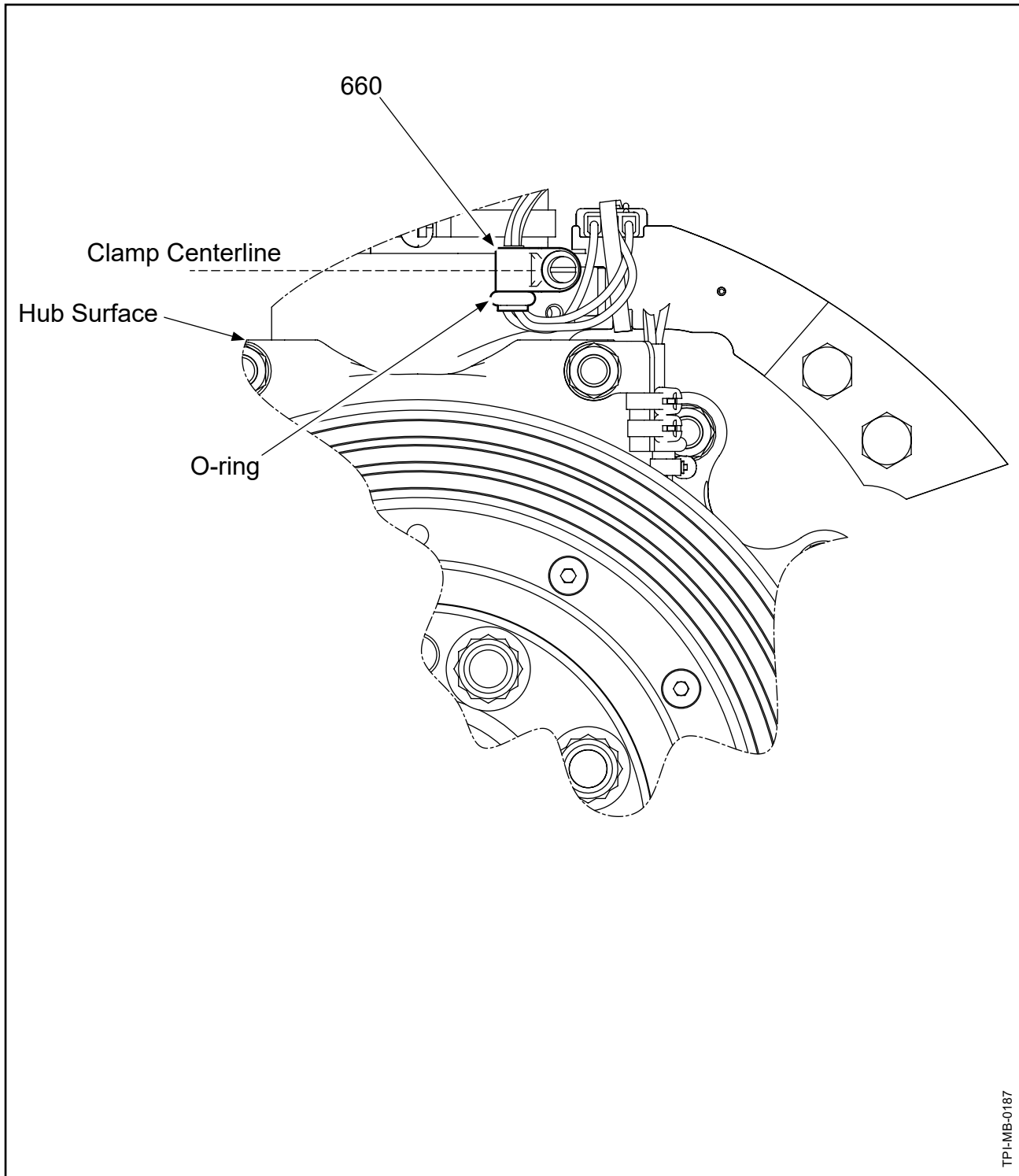
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106783**



**Wire Harness-to-Blade Shank/Counterweight  
Figure CZ-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

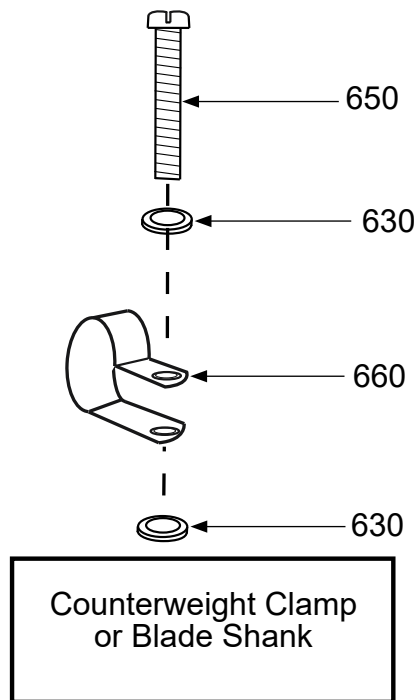
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106783**



**Loop Clamp Orientation  
Figure CZ-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

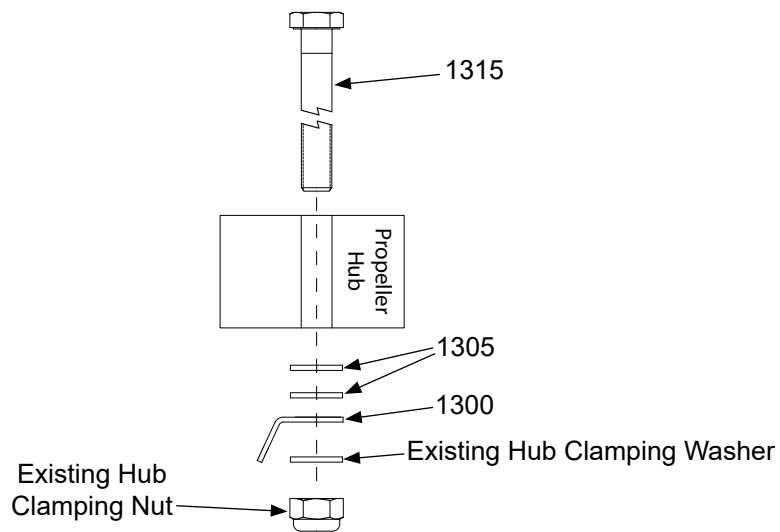
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106783**



**Loop Clamp to Counterweight/Blade Shank Hardware Configuration  
Figure CZ-6**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

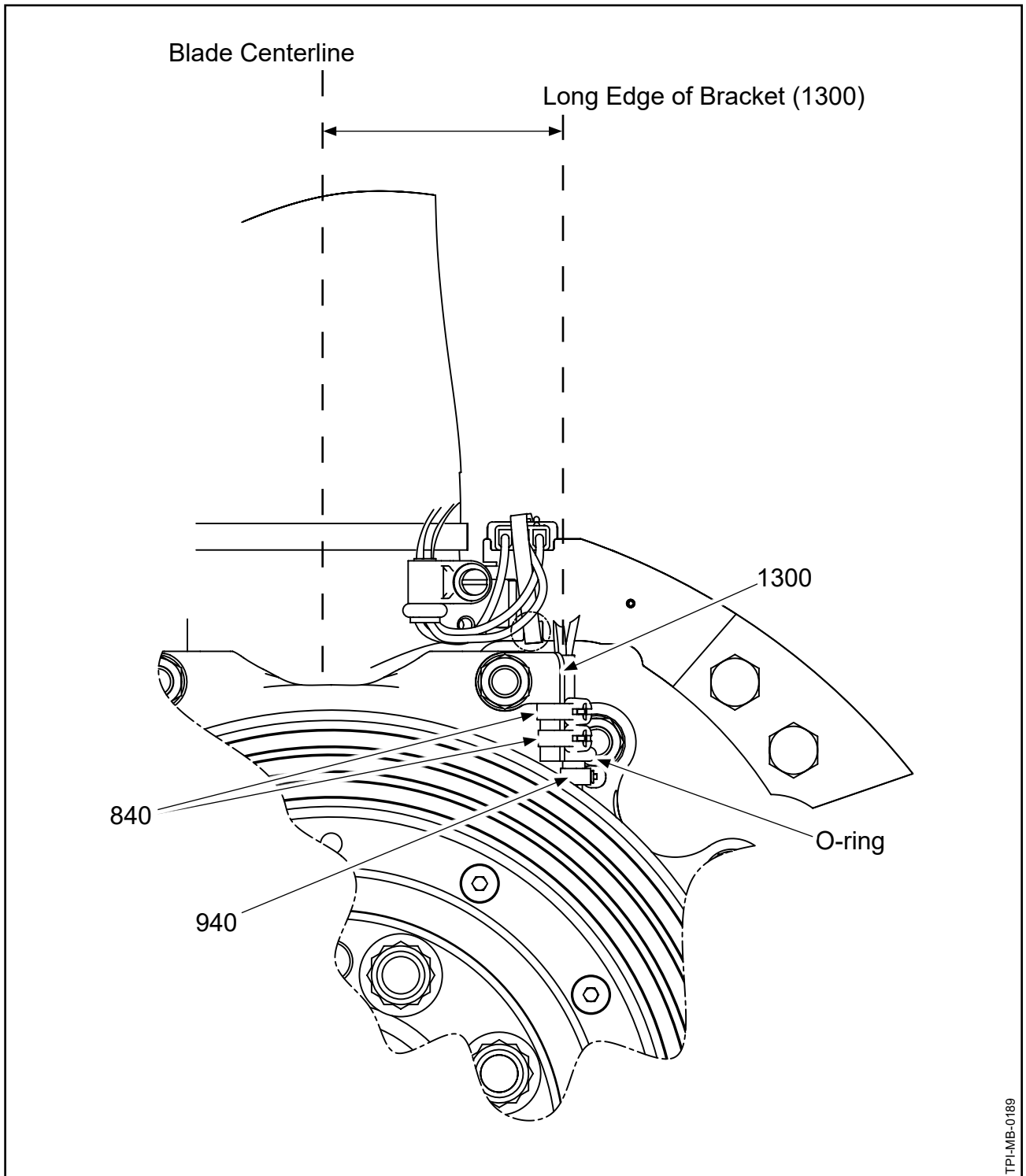
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106783**



**Wire Harness Bracket Hardware Configuration  
Figure CZ-7**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

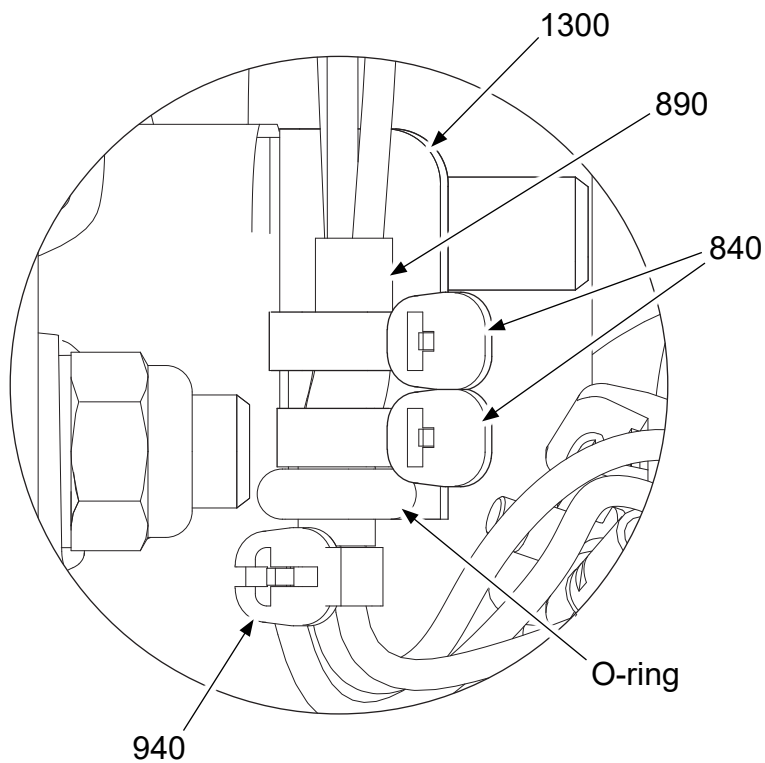
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106783**



**Wire Harness Bracket Alignment  
Figure CZ-8**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106783**



TPI-MB-0088

**Wire Harness-to-Bracket  
Figure CZ-9**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106783**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>106783</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11CZ</b> <b>FIGURES: CZ-1 thru CZ-9</b>		
170	1H1150-2	• TERMINAL STRIP	4	
190	2H1365	• TAPPED EYELET	8	Y
200	B-3854-41	• WASHER, LOCK	8	Y
210	B-3854-41	• WASHER, LOCK	8	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	8	Y
630	B-3837-0332	• WASHER, CORROSION RESISTANT	8	Y
645	B-3855-32	• DELETED	-	
650	B-3840-7	• SCREW, 10-32, FILLISTER HEAD	4	Y
660	B-3853-F5	• CLAMP, LOOP, NYLON	4	Y
840	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	8	Y
890	106615	• WIRE HARNESS	4	Y
905	B-3842-0437	• SPRING PIN, 3/32", CRES	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	4	Y
920	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	4	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	4	Y
1140	106556	• SLIP RING ASSEMBLY	1	
1170	A-2070-11	• SCREW, 1/4-28, BUTTON HEAD	8	Y
1300	B-6265L	• BRACKET, WIRE HARNESS, LH	4	
1305	B-3834-0663	• WASHER	8	Y
1315	102691	• BOLT, 3/8-24, HEX HEAD	4	

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 106783**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106783**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

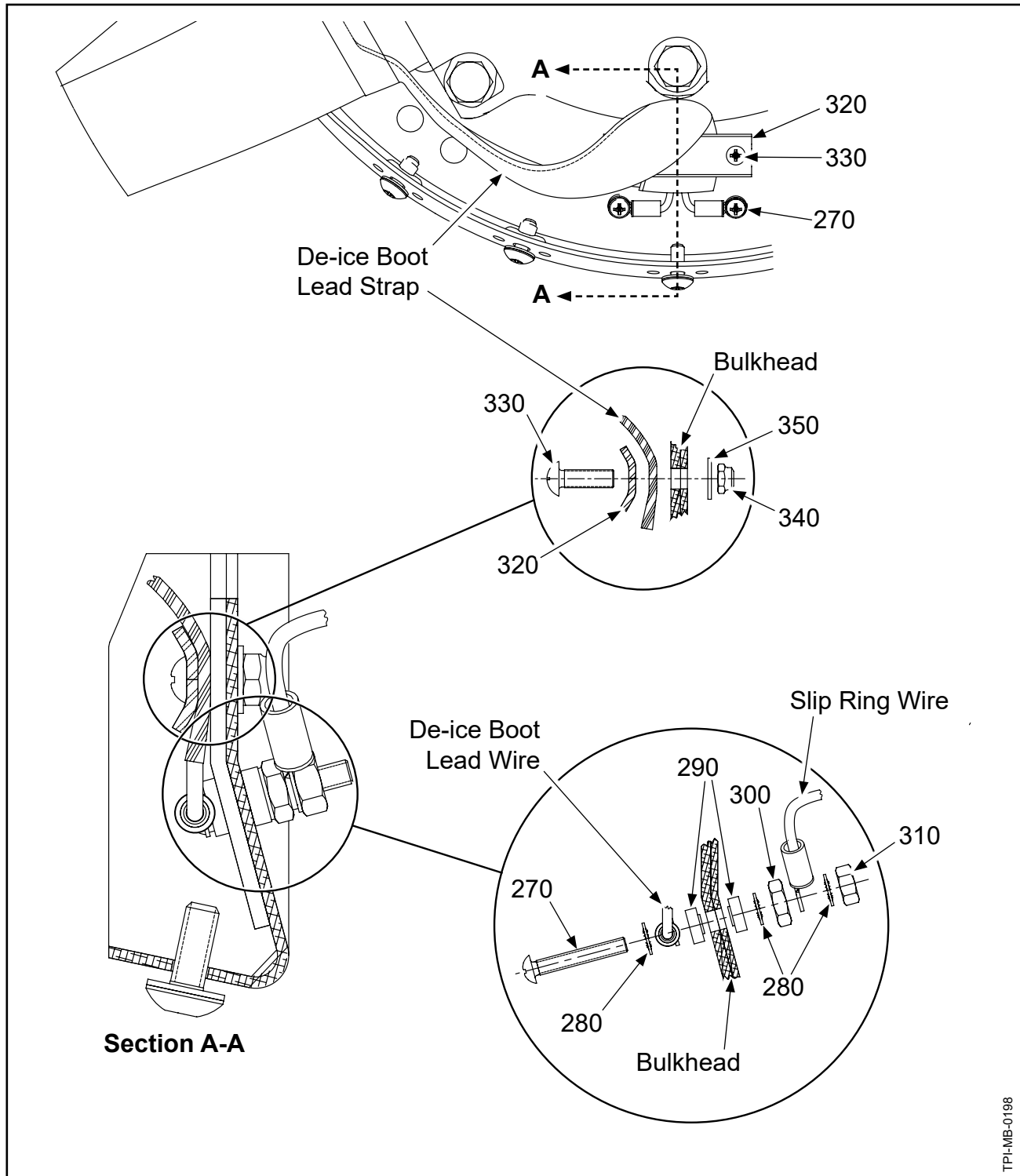
This section includes the installation instructions and parts list(s)  
for the following electric de-ice kit(s):  
**106831**

**DA. Installation Instruction 11DA**

- (1) Install the applicable airframe de-ice kit in accordance with the Airframe De-ice Kit chapter of this manual.
  - (2) Using the screws (330), washers (350), and self-locking nuts (340), install the lead strap clips (320) in accordance with Figure DA-1.
    - (a) Do not tighten the screws (330) at this time.
- NOTE:** The lead strap clips (320) must be loose enough that the de-ice boot lead straps can be installed under the clips.
- (3) Route the de-ice boot lead straps under the lead strap clips (320) as shown in Figure DA-1.
  - (4) Using the screws (270), lock washers (280), insulating bushings (290), and brass nuts (300), connect the de-ice boot lead wires to the bulkhead in accordance with Figure DA-1.
    - (a) Torque the brass nuts (300) to 6-8 In-Lbs (0.7-0.9 N•m).
  - (5) Using the lock washers (280) and thin self-locking nuts (310), connect the slip ring wires to the bulkhead in accordance with Figure DA-1.
    - (a) Torque the self-locking nuts (310) to 10-12 In-Lbs (1.2-1.3 N•m).
  - (6) Tighten the screws (330) until snug.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the installation instructions and parts list(s)  
for the following electric de-ice kit(s):  
**106831**



**De-ice Boot Lead Wires and Slip Ring Wires to the Bulkhead  
Figure DA-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the installation instructions and parts list(s)  
for the following electric de-ice kit(s):  
**106831**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>106831</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11DA</b> <b>FIGURES: DA-1</b>		
270	B-7035-14	• SCREW, 6-32, PAN HEAD, BRASS	6	
280	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	18	Y
290	2H1260	• INSULATING BUSHING	12	
300	B-6641-265	• NUT, HEX, BRASS	6	
310	102856-C06	• NUT, SELF-LOCKING, THIN, CRES	6	
320	3H1271-2	• CLIP, LEAD STRAP	3	
330	B-6637-30	• SCREW, PAN HEAD, CRES.	6	
340	B-6655-06	• NUT, HEX, SELF-LOCKING	6	
350	B-3837-N832	• WASHER, CORROSION RESISTANT	6	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 106831**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the installation instructions and parts list(s)  
for the following electric de-ice kit(s):  
**106831**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**107020**

**DB. Installation Instruction 11DB**

- (1) Using the screw (220), washers (200 and 210), tapped eyelet (190), attach the terminal strip (170) to the bulkhead in accordance with Figure DB-1.
  - (a) Torque the screw (220) to 10-12 In-Lb (1.2-1.3 N•m).
- (2) Using the screws (1170), attach the slip ring (1140) and the bulkhead to the hub in accordance with the applicable configuration shown in Figure DB-2.
  - (a) Torque each screw (1170) to 8-10 Ft-Lbs (10.9-13.5 N•m).
- (3) Complete a slip ring run-out check in accordance with the Check chapter in this manual.
- (4) Put the propeller blades at reverse blade angle.
- (5) If required, press the spring pin (905) perpendicularly into the hole in the counterweight as shown in Figure DB-3. The spring pin must extend to a height of 0.170 - 0.210 inch (4.32 - 5.33 mm).

**NOTE:** The counterweight may have been drilled for the spring pin (905) or may have an integral (cast) pin in place of the spring pin.

- (6) Assemble the plug connection between the wire harness (890) and the de-ice boot.
- (7) Install the wire harness/de-ice boot plug connections in the groove in the counterweight against the spring pin (905) or integral cast pin as shown in Figure DB-4.
- (8) Install the tie strap (910) in the retaining grooves of the counterweight and around the counterweight, and between the wires of the wire harness/de-ice boot plug connection as shown in Figure DB-4.

**CAUTION:** ROUTING THE TIE STRAP (910) INCORRECTLY CAN CAUSE AN ELECTRICAL SHORT IN THE DE-ICE SYSTEM.

- (a) On the boot-side of the plug connection, install the tie strap (910) over pin location 3 on the connector and the spring pin (905) as shown in Figure DB-4.
  - (b) On the wire harness-side of the plug connection, install the tie strap (910) between wire 1 and wire 2 as shown in Figure DB-4.
  - (c) Position the head of tie strap (910) in the approximate location shown in Figure DB-4.
- (9) Using the tie strap (930), attach the de-ice boot lead wires to the tie strap (910) as shown in Figure DB-4.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**107020**

**DB. Installation Instruction 11DB**

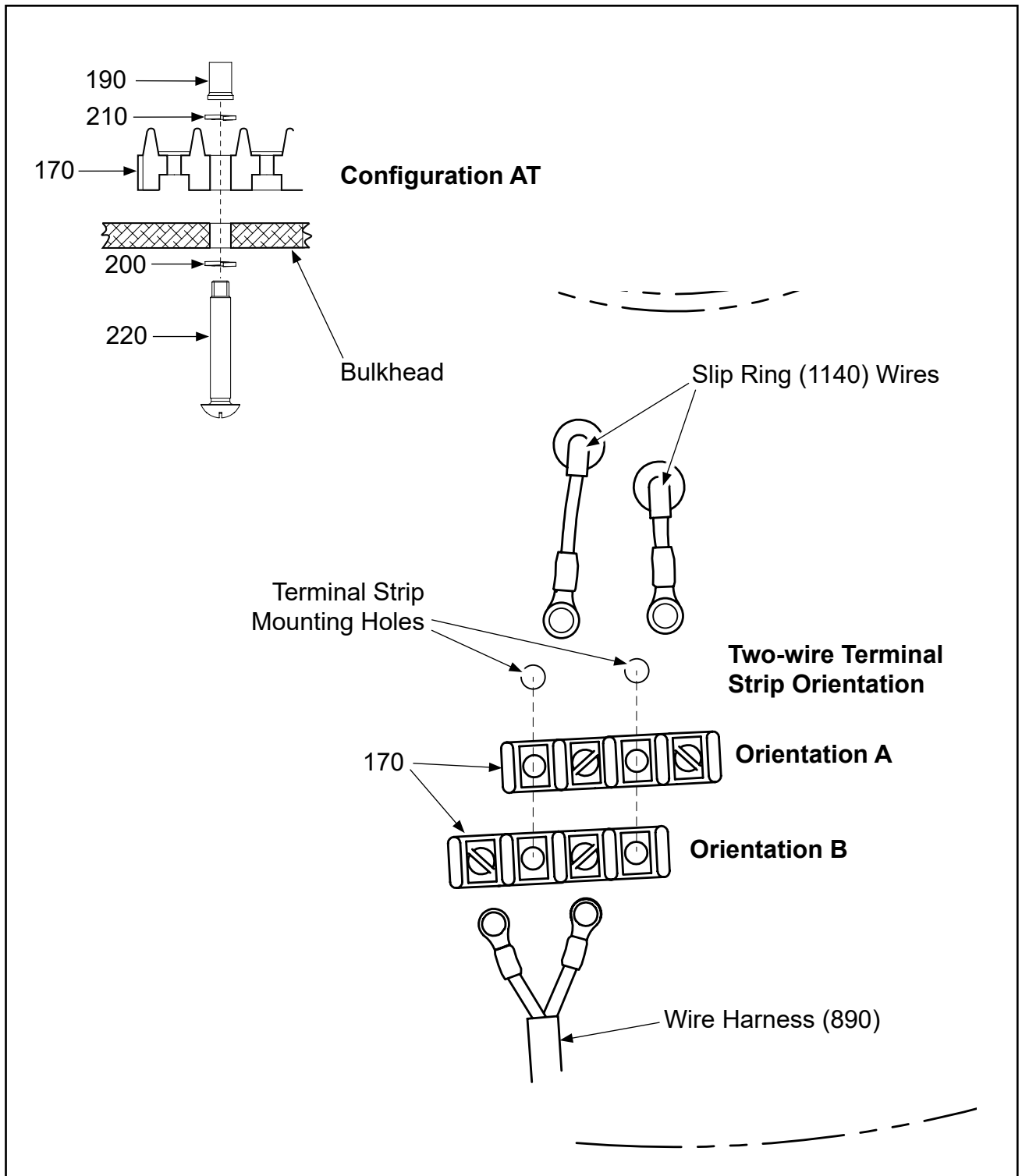
- (10) Install the tie strap (920) around the blade shank and over the de-ice boot lead wires as shown in Figure DB-4.
  - (a) The head of tie strap (920) must be located at the trailing edge of the blade as shown in Figure DB-5.
- (11) Install the clamp (660), around the wire harness (890) and position against the O-ring as shown in Figure DB-6.
- (12) Position the centerline of the clamp (660) parallel to the hub surface as shown in Figure DB-6.
- (13) Apply threadlocker CM399 to the threads of the screw (650).
- (14) Using screw (650) and washers (630), install the clamp (660) to the counterweight in accordance with Figure DB-6.
  - (a) Torque the screw (650) to 20-22 In-Lb (2.3-2.4 N•m).
- (15) Install the wire harness bracket (1300) and washers (1305) on the the hub clamping bolt (1315) in accordance with the applicable configuration in Figure DB-7.
  - (a) Position the wire harness bracket (1300) parallel to the blade as shown in Figure DB-7.
  - (b) Install the hub clamping nut.
  - (c) Torque the hub clamping nut to 20-22 Ft-Lb (28-29 N•m).
    - 1 A minimum of one thread must be visible above the hub clamping nut after it is torqued.
- (16) Attach the wire harness (890) to the wire harness bracket (1300) as shown in Figure DB-8.
  - (a) Position the wire harness (890) on the bracket (1300) with the O-ring on top of the bracket as shown in Figure DB-8.
  - (b) Attach the wire harness (890) to the bracket (1300) with the tie straps (840). Twisting of the lead wires is not permitted.
- (17) Attach the slip ring lead wires and de-ice wire harness (890) to the terminal strip (170) in accordance with the applicable configuration in Figure DB-9.
  - (a) Tighten the terminal screws until snug.
- (18) Cycle the propeller blades from reverse angle to feather angle to verify proper wire harness installation.
  - (a) Make sure the wire harness is not blocked during cycling.



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**107020**



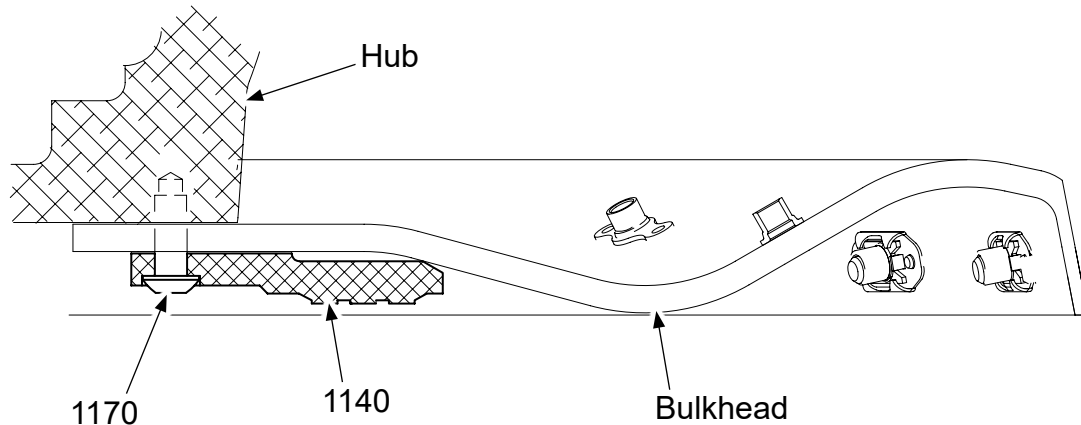
**Terminal Strip: Bulkhead Mounted  
Figure DB-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

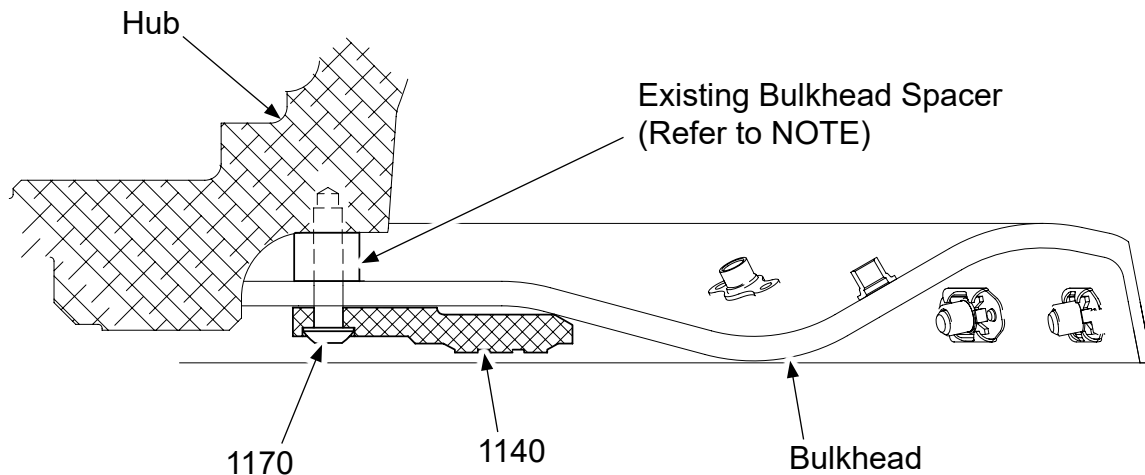
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**107020**

**Typical Slip Ring Installation (without bulkhead spacer)**



**Typical Slip Ring Installation (with bulkhead spacer)**



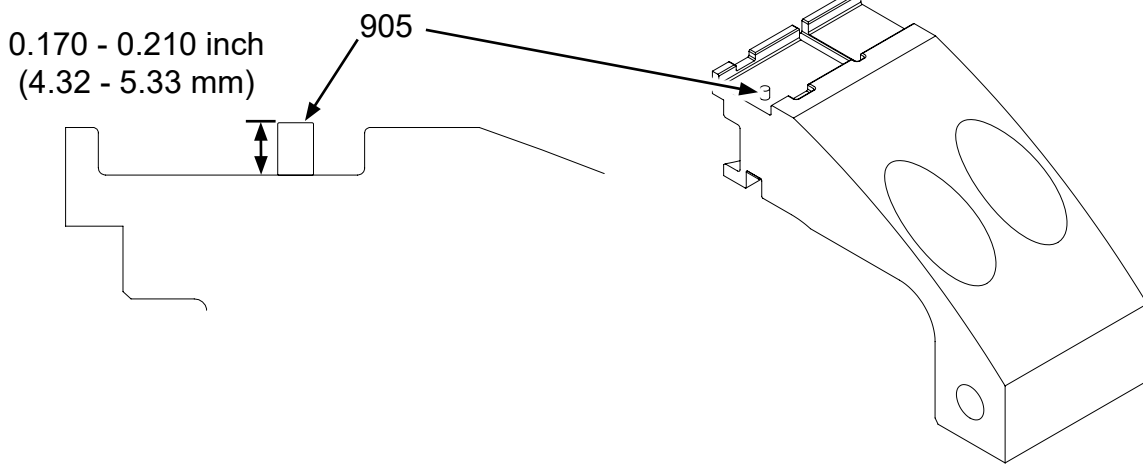
**NOTE:** The bulkhead spacer is a spinner mounting component and is application specific. Refer to Hartzell Propeller Application Guide Manual 159 (61-02-59).

TPI-MB-0204, TPI-MB-0223

**Slip Ring Mounting  
Figure DB-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**107020**

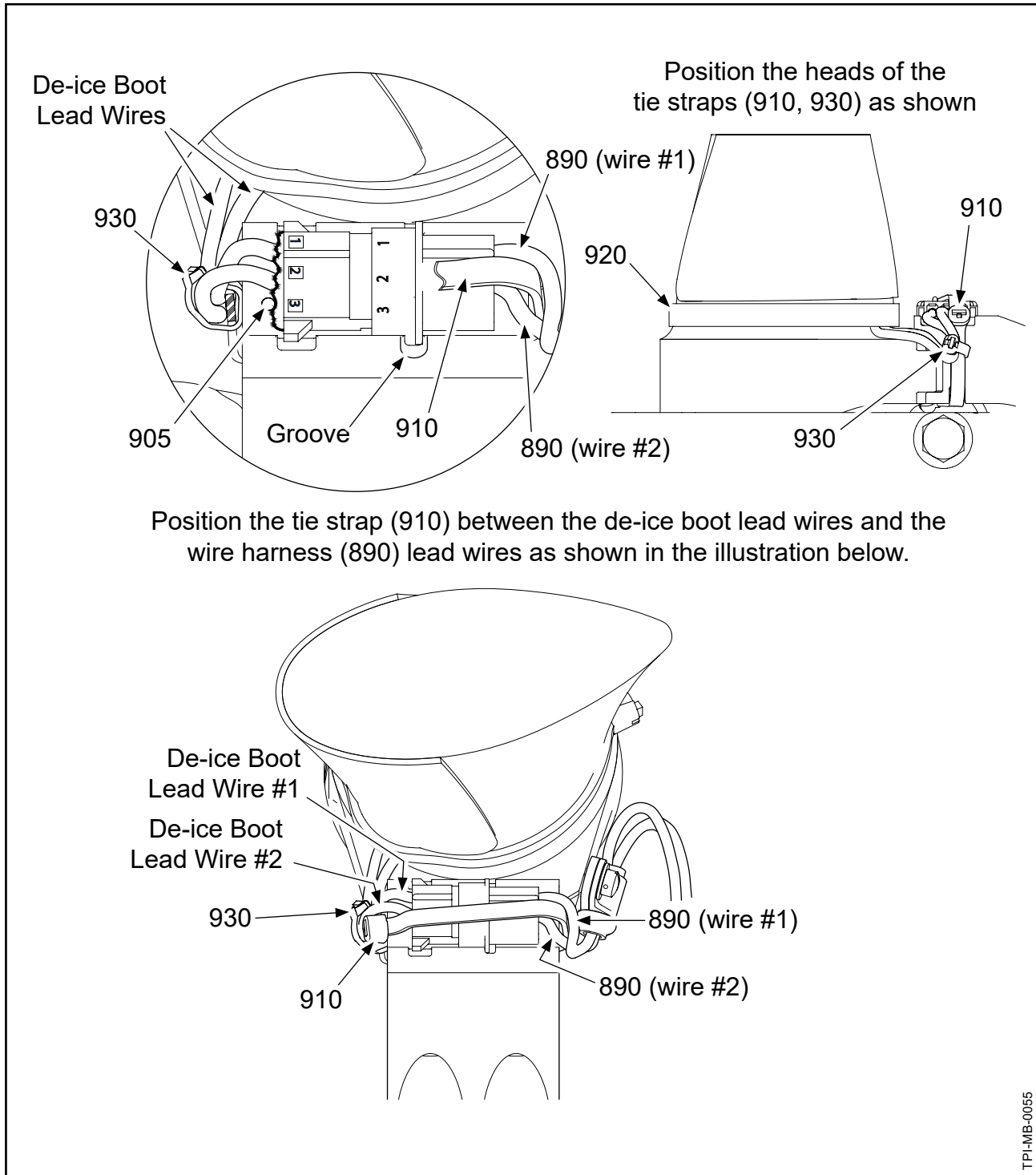


TPI-MB-0078

**Spring Pin Height  
Figure DB-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

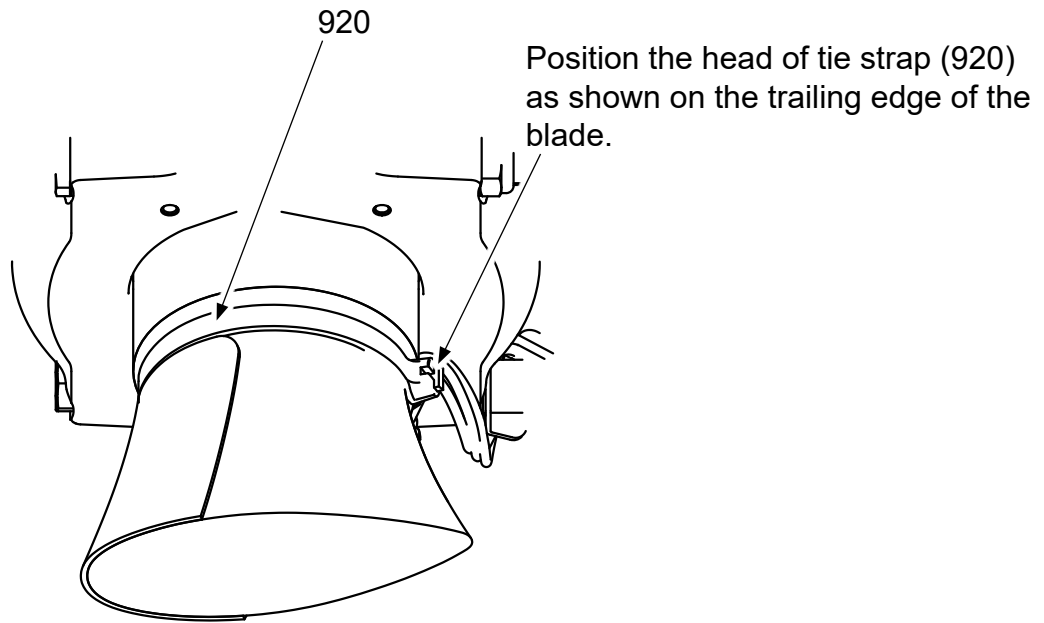
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**107020**



**Wire Harness to Blade Shank/Counterweight  
Figure DB-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**107020**

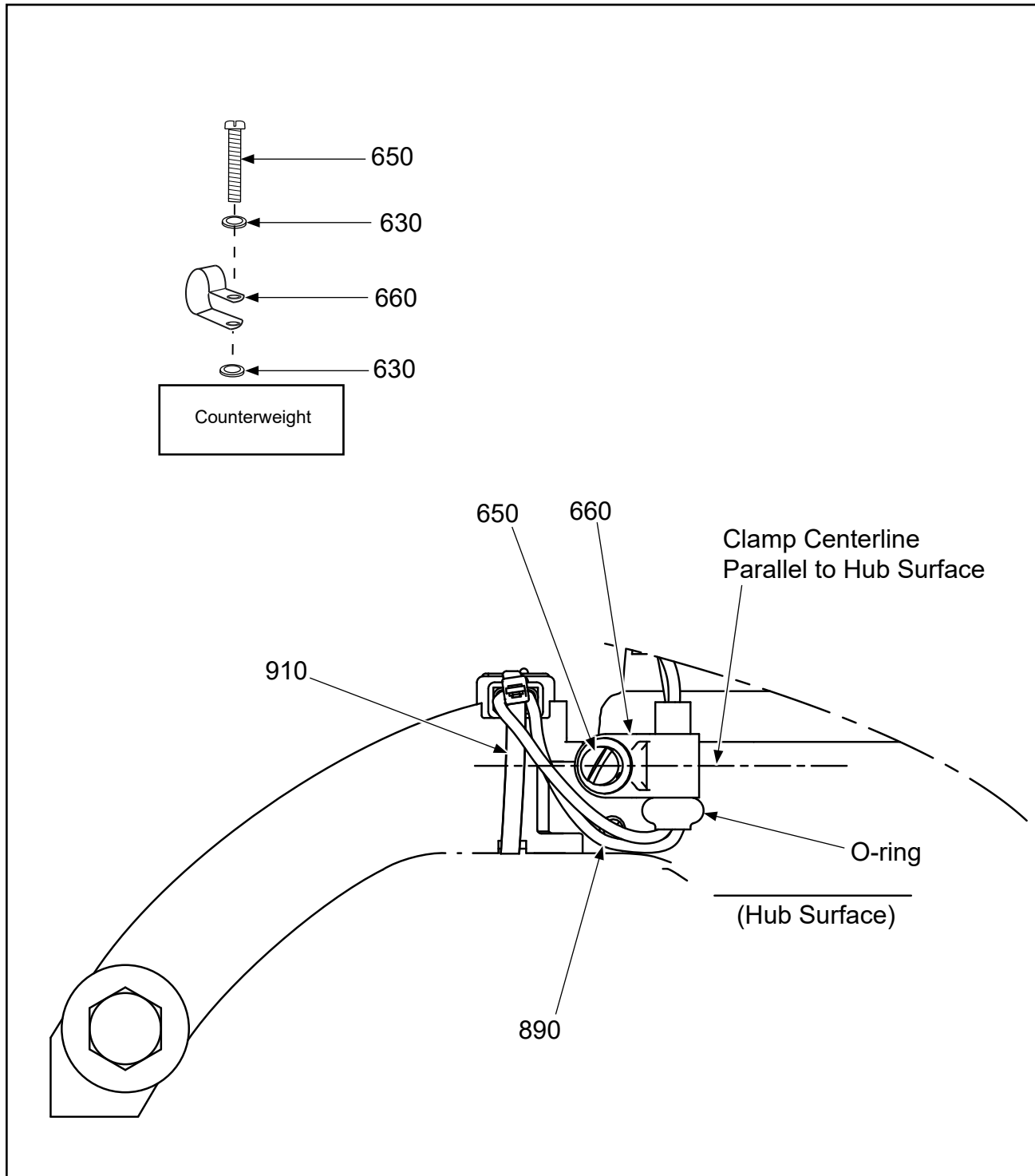


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**Wire Harness to Blade Shank  
Figure DB-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**107020**

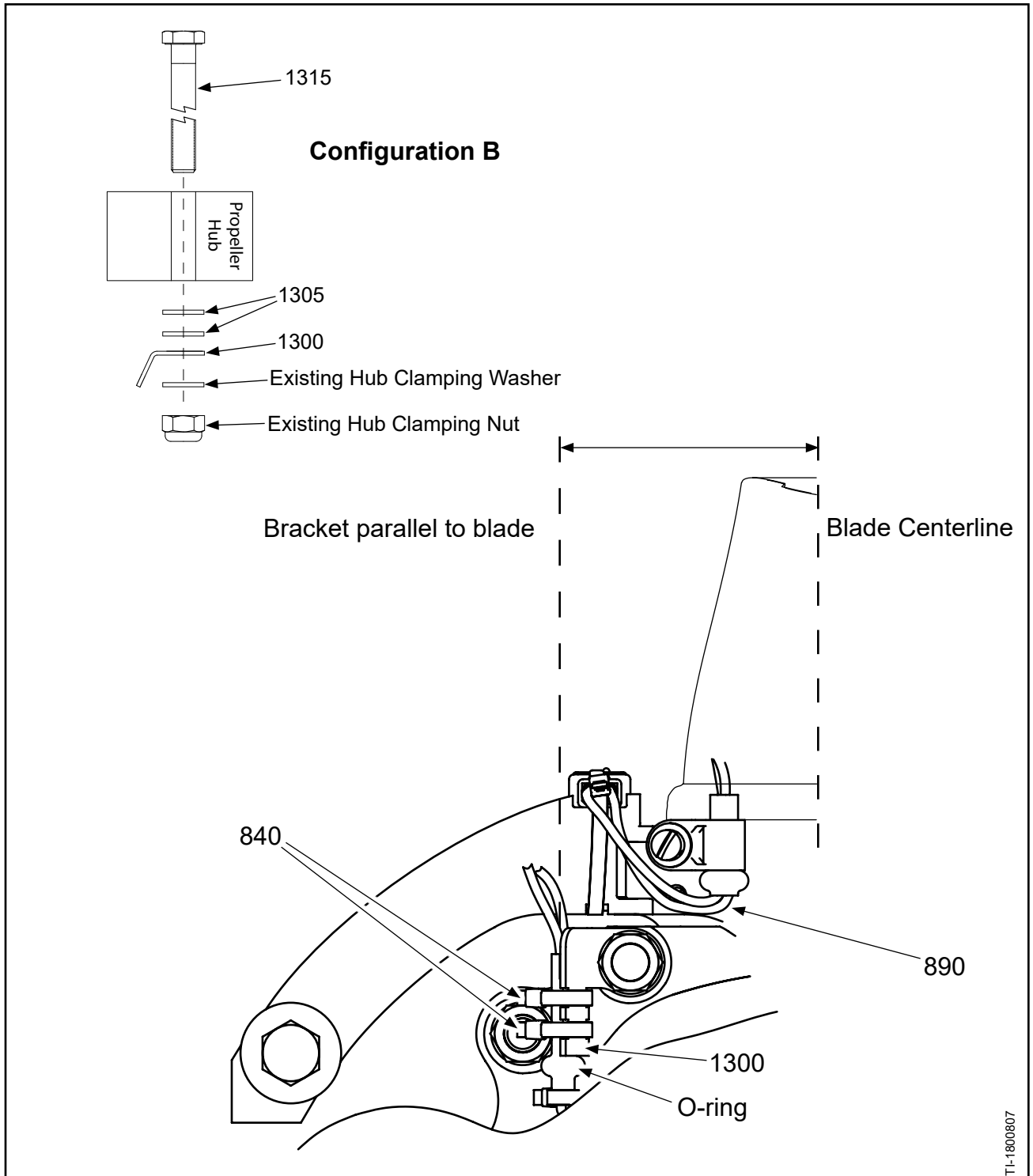


**Loop Clamp Orientation  
Figure DB-6**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

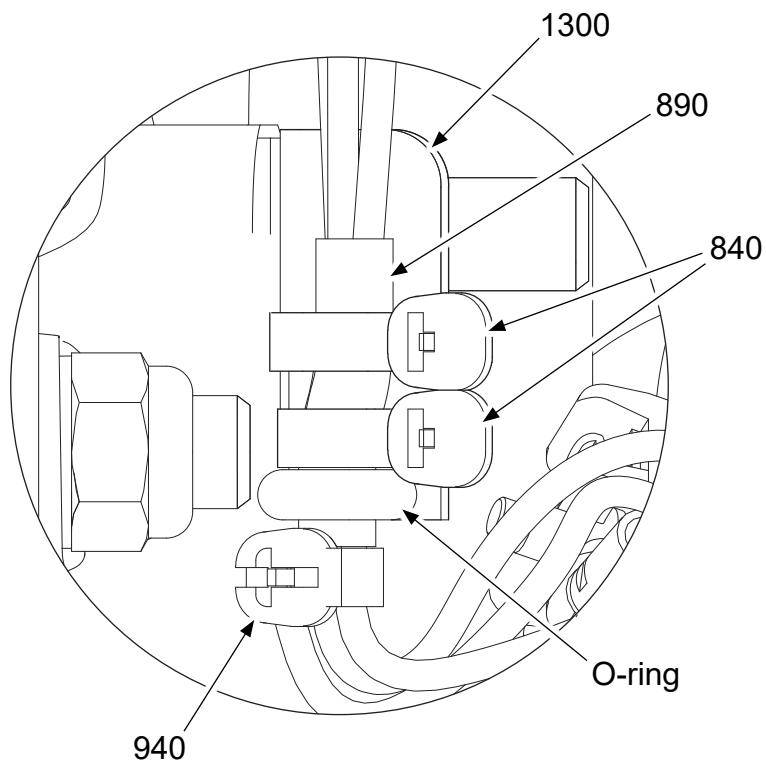
**107020**



**Wire Harness Bracket  
Figure DB-7**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**107020**



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**Wire Harness-to-Bracket  
Figure DB-8**

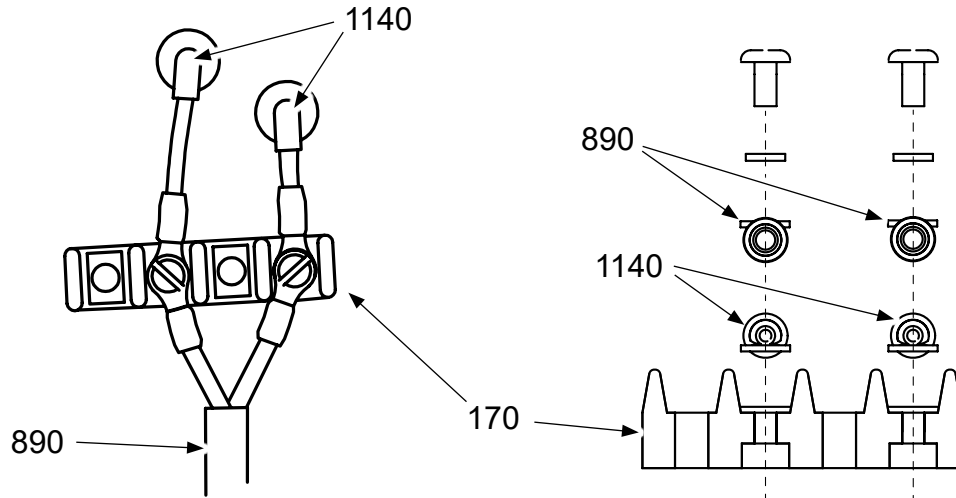


**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**107020**

**Typical Two-wire Configuration**



**NOTE:** The illustrations show slip ring wires on a  
typical right-hand (rotation) propeller.

**Terminal Strip Lead Wire Configurations: Bulkhead Mounted  
Figure DB-9**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**107020**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>107020</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11DB FIGURES: DB-1 thru DB-9</b>		
170	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM	4	
190	2H1365	• TAPPED EYELET	8	Y
200	B-3854-41	• WASHER, LOCK	8	Y
210	B-3854-41	• WASHER, LOCK	8	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	8	Y
630	B-3837-0332	• WASHER, CORROSION RESISTANT	8	Y
645	B-3855-32	• DELETED	-	
650	B-3840-7	• SCREW, 10-32, FILLISTER HEAD	4	Y
660	B-3853-F5	• CLAMP, LOOP, PLASTIC	4	Y
840	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	8	Y
890	107019	• WIRE HARNESS	4	Y
905	B-3842-0437	• SPRING PIN, 3/32", CRES	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	4	Y
920	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	4	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	4	Y
1140	4H2674-1	• SLIP RING ASSEMBLY	1	
1170	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	8	Y
1300	B-6265	• BRACKET, WIRE HARNESS	4	
1305	B-3834-0663	• WASHER	8	Y
1315	102691	• BOLT, 3/8-24, HEX HEAD	4	

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 107020**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**107038 and 108342**

DC. Installation Instruction 11DC

- (1) Using the screws (220), washers (210), tapped eyelets (190), attach the terminal strip (170) to the bulkhead in accordance with the applicable configuration in Figure DC-1.
  - (a) 107038: Configuration A  
108342: Configuration B
  - (b) Torque the screw (220) to 10-12 In-Lb (1.2-1.3 N•m).
- (2) Using the screws (1170), attach the slip ring (1140) and the bulkhead to the hub in accordance with the applicable configuration shown in Figure DC-2.
  - (a) Torque each screw (1170) to 8-10 Ft-Lbs (10.9-13.5 N•m).
- (3) Complete a slip ring run-out check in accordance with the Check chapter in this manual.
- (4) Put the propeller blades at reverse blade angle.
- (5) If required, press the spring pin (905) perpendicularly into the hole in the counterweight as shown in Figure DC-3. The spring pin must extend to a height of 0.170-0.210 inch (4.32-5.33 mm).

NOTE: The counterweight may have been drilled for the spring pin (905) or may have an integral (cast) pin in place of the spring pin.

- (6) Assemble the plug connection between the wire harness (890) and the de-ice boot.
- (7) Install the wire harness/de-ice boot plug connections in the groove in the counterweight against the spring pin (905) or integral cast pin as shown in Figure DC-4.
- (8) Install the tie strap (910) in the retaining grooves of the counterweight and around the counterweight, and between the wires of the wire harness/de-ice boot plug connection as shown in Figure DC-4.

CAUTION: ROUTING THE TIE STRAP (910) INCORRECTLY CAN CAUSE AN ELECTRICAL SHORT IN THE DE-ICE SYSTEM.

- (a) On the wire harness-side of the plug connection, install the tie strap (910) between wire 2 and wire 3 as shown in Figure DC-4.
- (b) On the boot-side of the plug connection, install the tie strap (910) between wire 1 and wire 2 and over the spring pin (905) as shown in Figure DC-4.
- (c) Position the head of tie strap (910) in the approximate location shown in Figure DC-4.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**107038 and 108342**

DC. Installation Instruction 11DC - continued

- (9) Using the tie strap (930), attach the de-ice boot lead wires to the tie strap (910) as shown in Figure DC-4.
- (10) Install the tie strap (920) around the blade shank and over the de-ice boot lead wires as shown in Figure DC-4.
  - (a) The head of tie strap (920) must be located at the trailing edge of the blade as shown in Figure DC-5.
- (11) Install the clamp (660), around the wire harness (890) and position against the O-ring as shown in Figure DC-6.
- (12) Apply threadlocker CM399 to the threads of the screw (650).
- (13) Using screw (650) and washers (630), install the clamp (660) to the counterweight in accordance with Figure DC-7.
  - (a) Position the clamp (660) so that there is  $0.07 \pm 0.01$  inch ( $1.8 \pm 0.2$  mm) clearance between the O-ring and the hub as shown in Figure DC-6.
  - (b) Torque the screw (650) to 20-22 In-Lb (2.3-2.4 N•m).
- (14) Install the wire harness bracket (1300), washers (1305), and aluminum spacer (1325) on the the hub clamping bolt (1315). Refer to the applicable configuration in Figure DC-8.
  - (a) Install one washer (1305) between the head of the hub clamping bolt (1315) and the hub.
  - (b) Install a minimum of one washer (1305) between the wire harness bracket (1300) and the hub.
    - 1 Use additional washers (1305) between the hub and the wire harness bracket (1300) as necessary to get the correct thread engagement and to make sure that a minimum of one exposed thread is above the nut.
  - (c) Position wire harness bracket (1300) parallel to the blade as shown in Figure DC-6.
  - (d) Install the hub clamping nut.
  - (e) Torque the hub clamping nut to 20-22 Ft-Lb (28-29 N•m).
    - 1 A minimum of one thread must be visible above the hub clamping nut after it is torqued.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

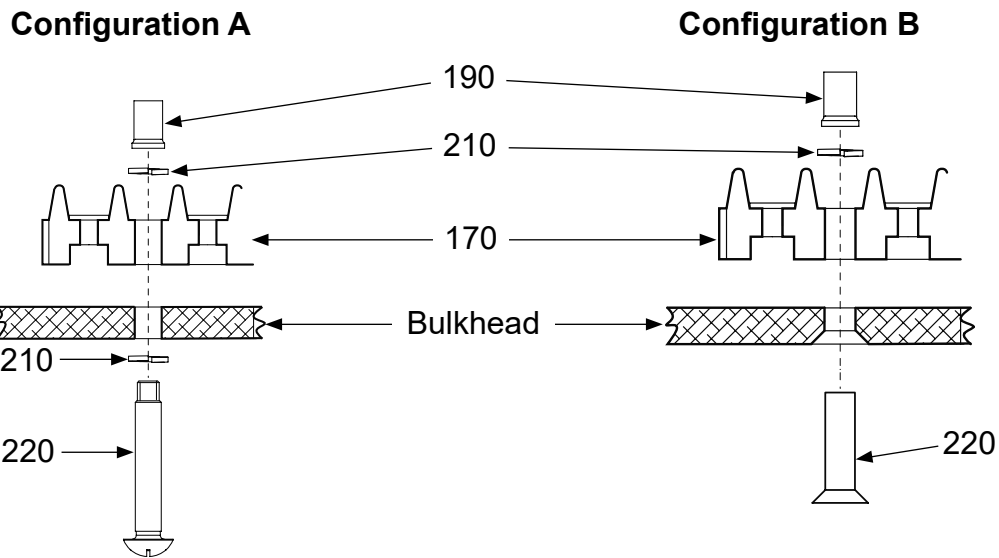
**107038 and 108342**

DC. Installation Instruction 11DC - continued

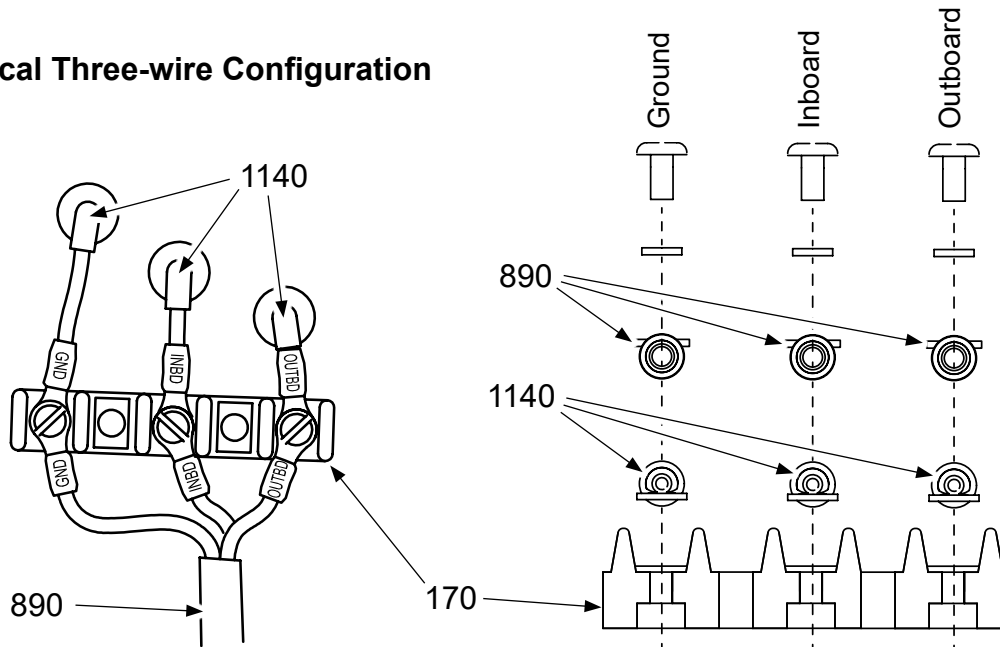
- (16) Attach the de-ice boot wire harness (890) to the wire harness bracket (1300) in accordance with Figure DC-9.
  - (a) Position the wire harness (890) on the bracket (1300) with the O-ring on top of the bracket as shown in Figure DC-9.
  - (b) Attach the wire harness (890) to the bracket (1300) with the tie straps (840). Twisting of the lead wires is not permitted.
- (17) Attach the slip ring lead wires and de-ice wire harness (890) to the terminal strip (170) in accordance with Figure DC-1.
  - (a) Tighten the terminal screws until snug.
- (18) Cycle the propeller blades from reverse angle to feather angle to verify proper wire harness installation.
  - (a) Make sure the wire harness is not blocked during cycling.

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**107038 and 108342**



## Typical Three-wire Configuration



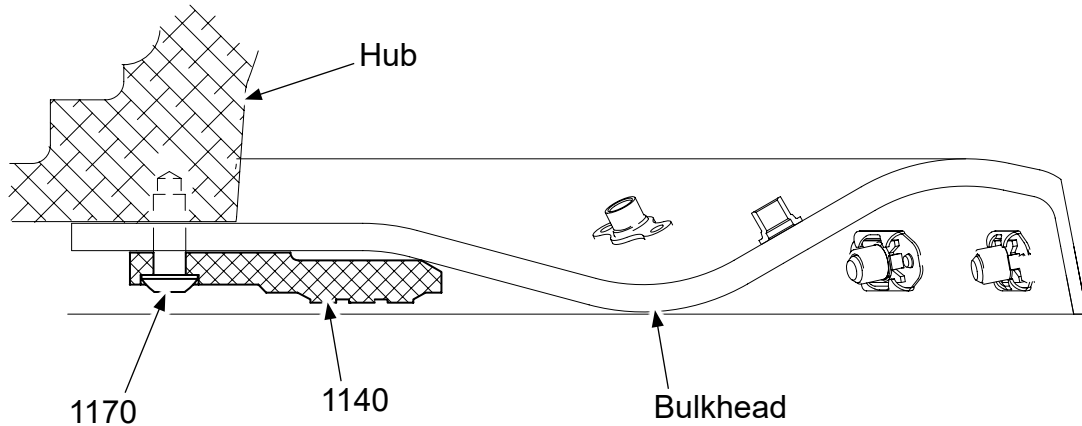
**NOTE:** The illustrations show slip ring wires on a typical right-hand (rotation) propeller.

**Terminal Strip: Bulkhead Mounted**  
**Figure DC-1**

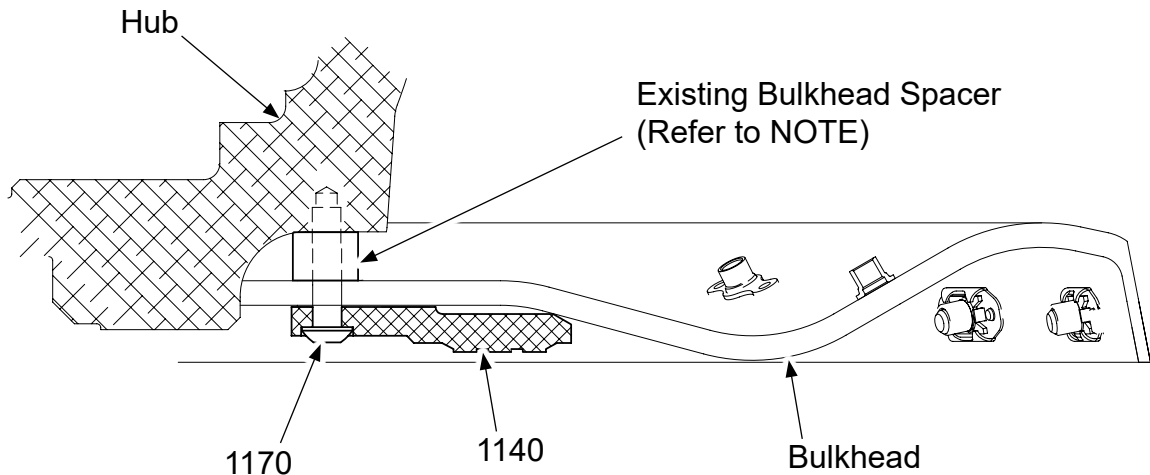
**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**107038 and 108342**

**Typical Slip Ring Installation (without bulkhead spacer)**



**Typical Slip Ring Installation (with bulkhead spacer)**



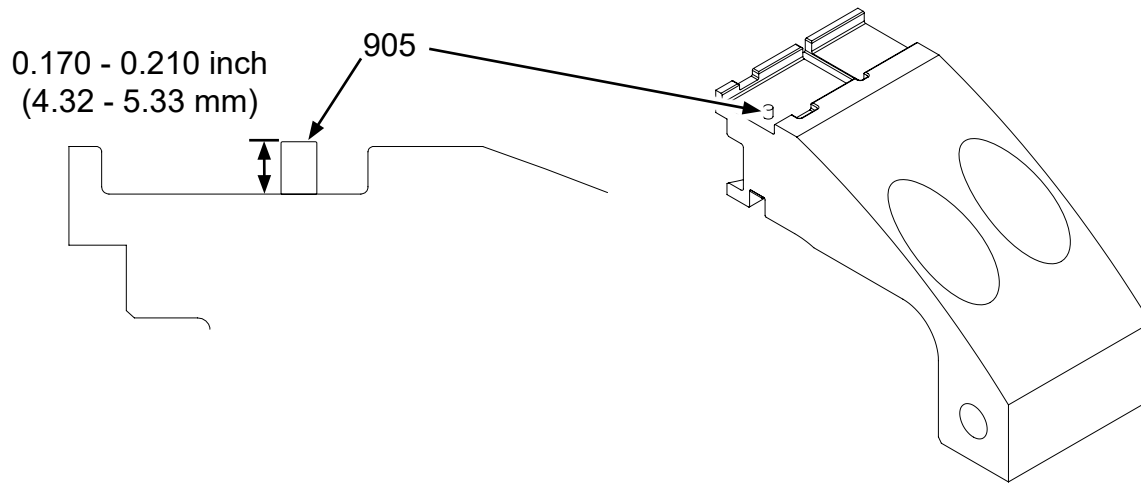
**NOTE:** The bulkhead spacer is a spinner mounting component and is application specific. Refer to Hartzell Propeller Application Guide Manual 159 (61-02-59).

TPI-MB-0204, TPI-MB-0223

**Slip Ring Mounting  
Figure DC-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**107038 and 108342**



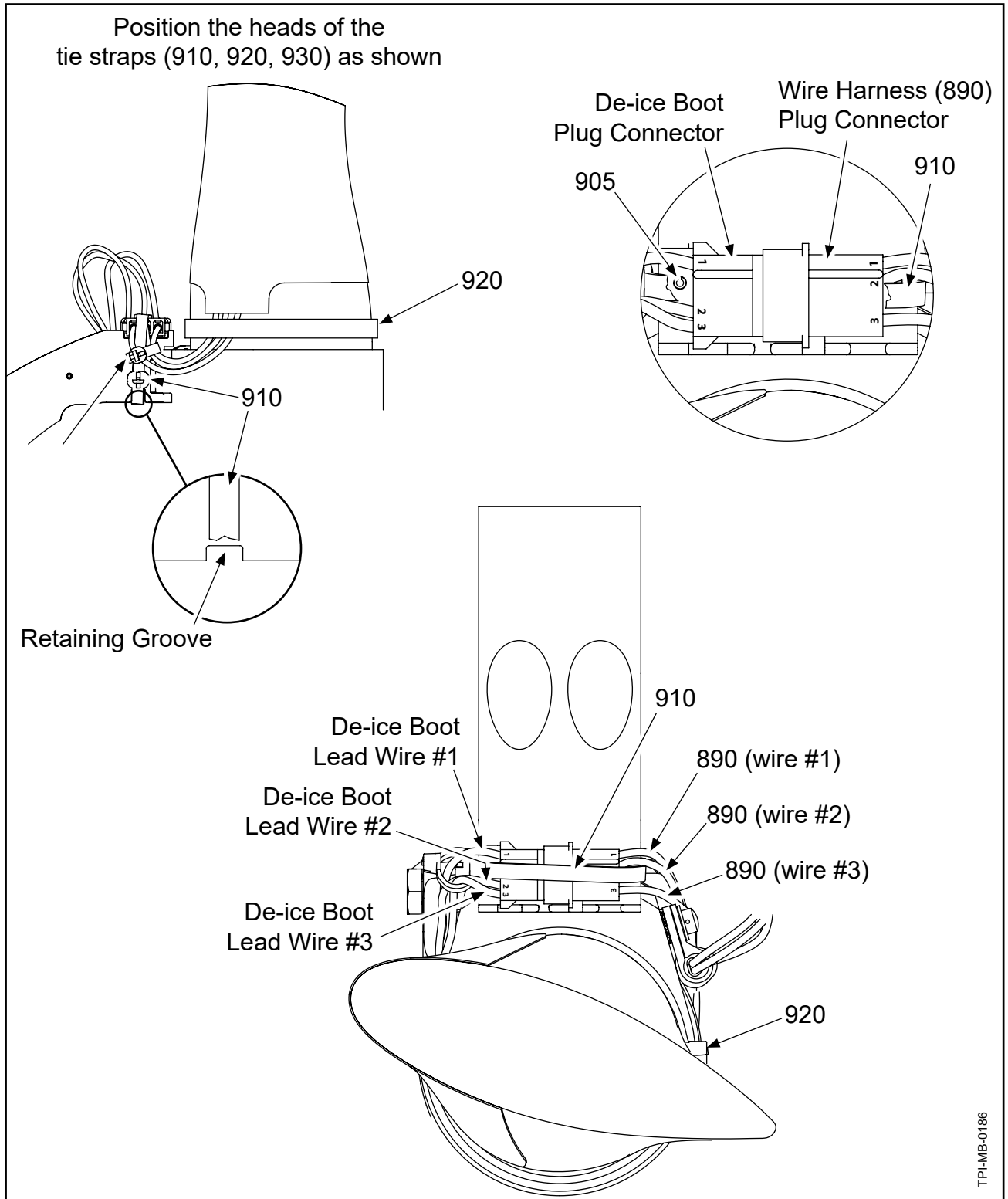
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**Spring Pin Height  
Figure DC-3**



# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

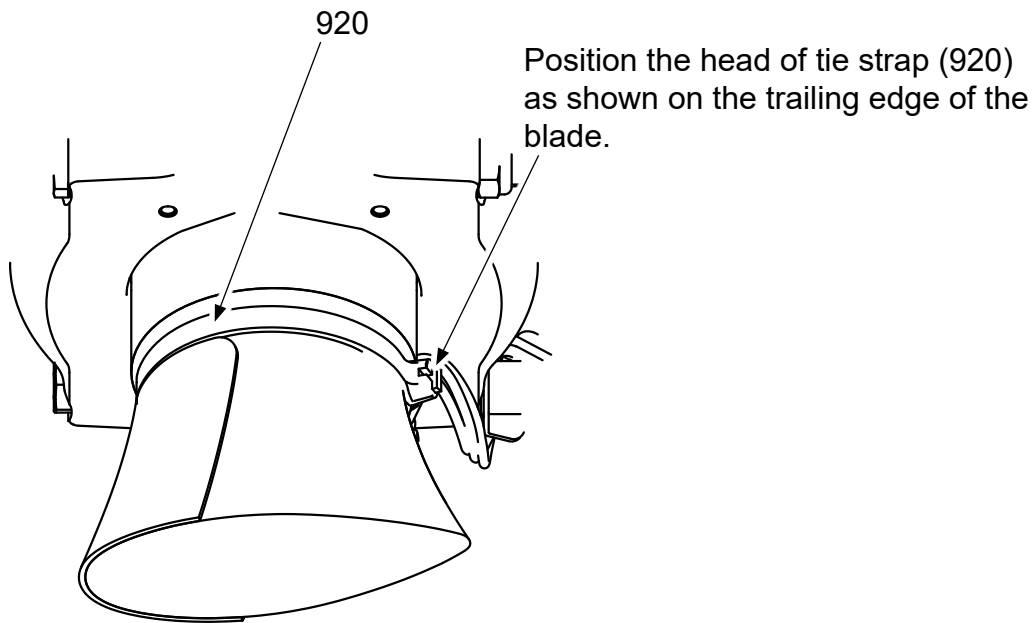
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**107038 and 108342**



**Wire Harness-to-Blade Shank/Counterweight**  
**Figure DC-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**107038 and 108342**

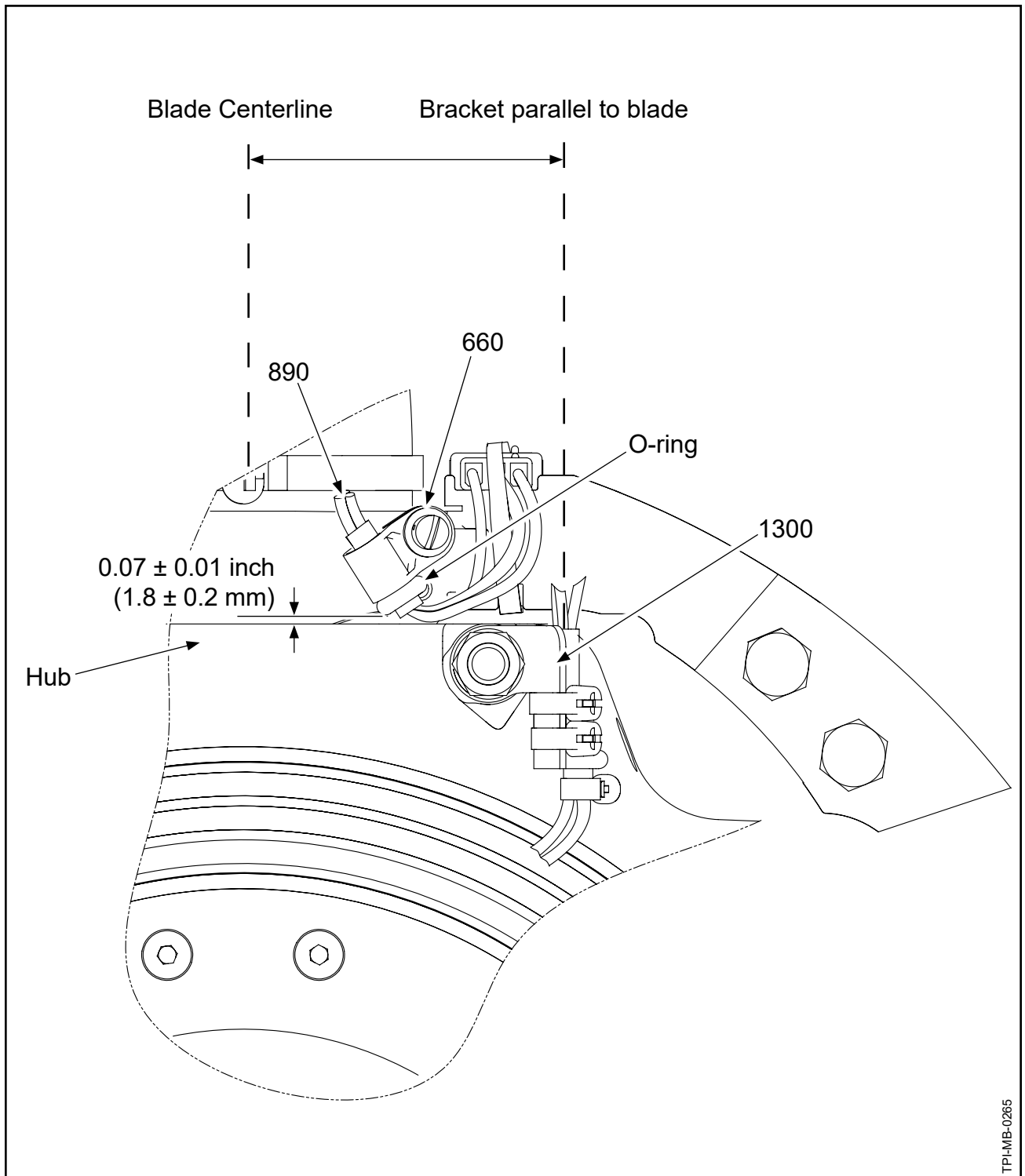


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**Wire Harness to Blade Shank  
Figure DC-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**107038 and 108342**

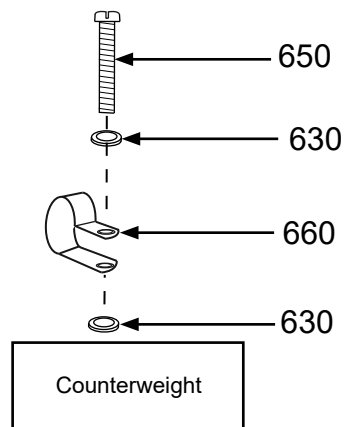


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**Loop Clamp Orientation  
Figure DC-6**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

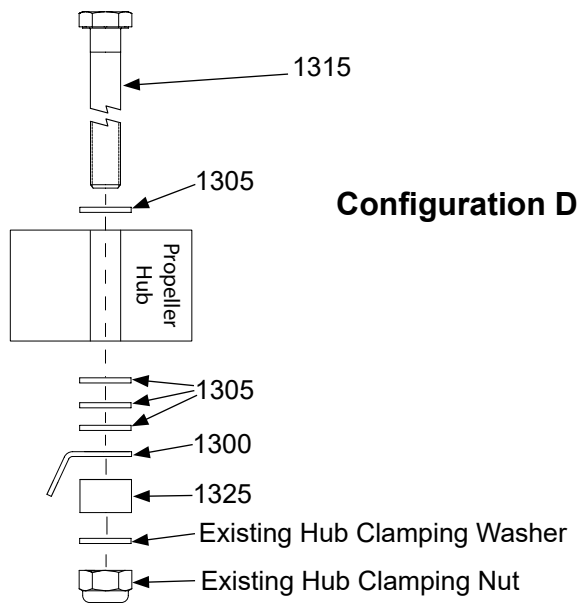
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**107038 and 108342**



**Loop Clamp to Counterweight/Blade Shank Hardware Configurations  
Figure DC-7**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

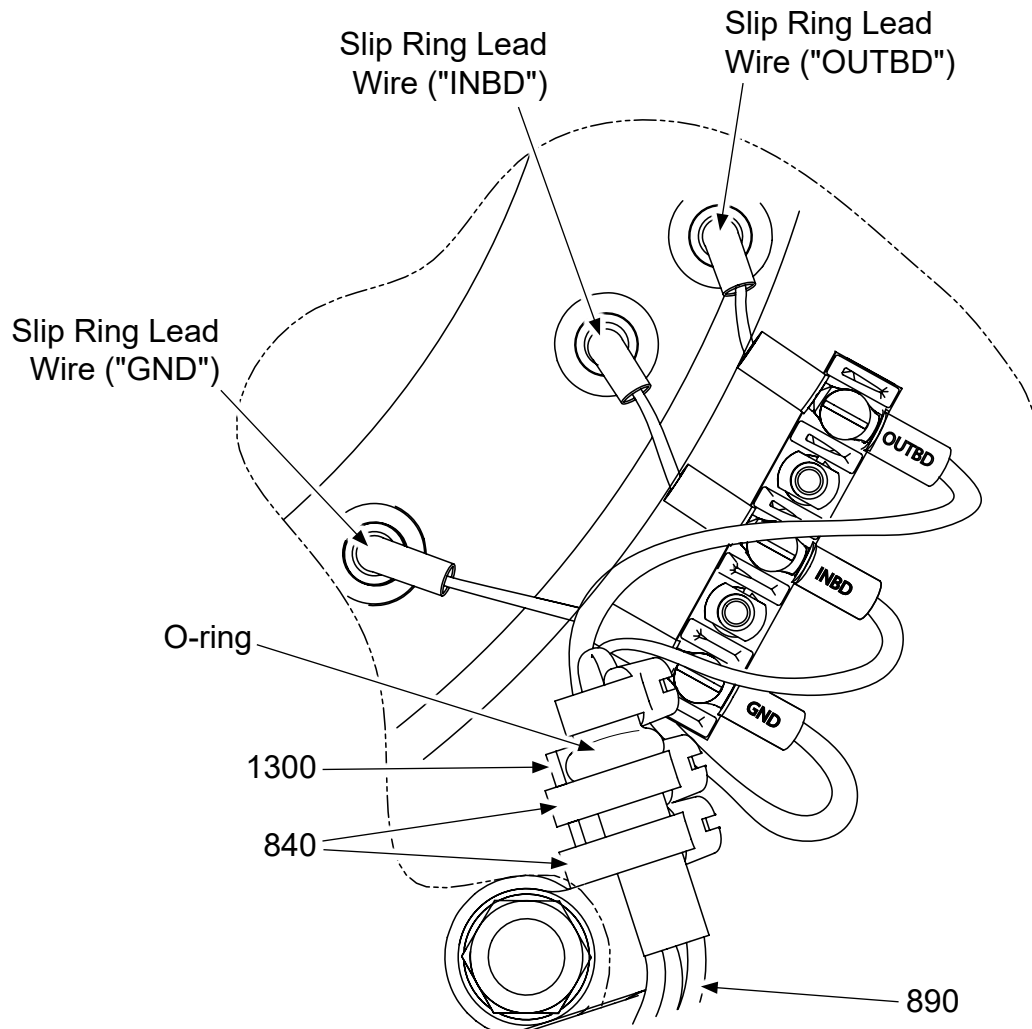
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**107038 and 108342**



**Wire Harness Bracket Hardware Configurations  
Figure DC-8**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**107038 and 108342**



**Wire Harness Bracket Alignment  
Figure DC-9**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**107038 and 108342**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>107038</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11DC FIGURES: DC-1 thru DC-9</b>		
170	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM	5	
190	2H1365	• TAPPED EYELET	10	Y
210	B-3854-41	• WASHER, LOCK	20	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	10	Y
630	B-3837-0332	• WASHER, CORROSION RESISTANT	10	Y
645	B-3855-32	• DELETED	-	
650	B-3840-7	• SCREW, 10-32, FILLISTER HEAD	5	Y
660	B-3853-F5	• CLAMP, LOOP, PLASTIC	5	Y
890	107039	• WIRE HARNESS	5	Y
905	B-3842-0437	• SPRING PIN, 3/32", CRES	5	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	5	Y
920	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	5	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	5	Y
1140	107042	• SLIP RING ASSEMBLY	1	
1170	A-2070-6	• SCREW, 1/4-28, BUTTON HEAD	10	Y
1300	B-6265L	• BRACKET, WIRE HARNESS	5	
1305	B-3834-0632	• WASHER	15	Y
1315	A-3219-1	• BOLT, 3/8-24, HEX HEAD	5	
1315A	107083	• BOLT, 3/8-24, HEX HEAD ALTERNATE FOR ITEM 1315, POST HC-SL-30-365	5	
1325	A-2246	• SPACER ALUMINUM	5	
840	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	10	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 107038**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**107038 and 108342**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>108342</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11DC</b> <b>FIGURES: DC-1 thru DC-9</b>		
170	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM	5	
190	2H1365	• TAPPED EYELET	10	Y
210	B-3854-41	• WASHER, LOCK	10	Y
220	B-3871-S32	• SCREW, PAN HEAD, CRES	10	Y
630	B-3837-0332	• WASHER, CORROSION RESISTANT	10	Y
645	B-3855-32	• DELETED	-	
650	B-3840-7	• SCREW, 10-32, FILLISTER HEAD	5	Y
660	B-3853-F5	• CLAMP, LOOP, PLASTIC	5	Y
840	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	10	Y
890	107039	• WIRE HARNESS	5	Y
905	B-3842-0437	• SPRING PIN, 3/32", CRES	5	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	5	Y
920	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	5	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	5	Y
1140	107042	• SLIP RING ASSEMBLY	1	
1170	A-2070-6	• SCREW, 1/4-28, BUTTON HEAD	10	Y
1300	B-6265L	• BRACKET, WIRE HARNESS	5	
1305	B-3834-0632	• WASHER	15	Y
1315	107083	• BOLT, 3/8-24, HEX HEAD	5	
1325	A-2246	• SPACER ALUMINUM	5	

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 108342**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2647-1 and 7931-67-896-1**

**DD. Installation Instruction 11DD**

- (1) Using the screws (1170), attach the slip ring (1140) and the bulkhead to the hub as shown in Figure DD-1.
  - (a) Torque each screw (1170) 96-120 In-Lbs (10.1-13.5 N•m).
  - (b) Perform slip ring run-out check in accordance with the Check chapter in this manual.
- (2) Position the propeller blades at reverse blade angle.
- (3) Assemble the plug connection between the wire harness (890) and the de-ice boot.
- (4) Install the tie strap (930) around the wire harness/de-ice boot plug connection.
- (5) Position the tie strap head (930) in approximate location shown in Figure DD-2.
- (6) Route the terminal end of the wire harness (890) through the hole in counterweight rib, as shown in Figure DD-2.
- (7) Secure the wire harness/boot connection to the counterweight.
  - (a) Install tie straps (910) under the tie strap (930) connecting the wire harness/boot plugs, and around the counterweight as shown in Figure DD-2.
  - (b) Position the tie strap head in the approximate location on the side of the counterweight as shown in Figure DD-2. Do not tighten the tie strap (910) at this time.
- (8) Verify that the wire harness (890) is taut through the counterweight hole.
- (9) Secure the wire harness (890) to the counterweight by installing the tie strap (930) through the counterweight hole and around the wire harness (890) on both sides of the counterweight. Position the tie strap head in the approximate location shown in Figure DD-2.
- (10) Tighten all of the tie straps (910 and 930).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2647-1 and 7931-67-896-1**

**DD.**    Installation Instruction 11DD - continued

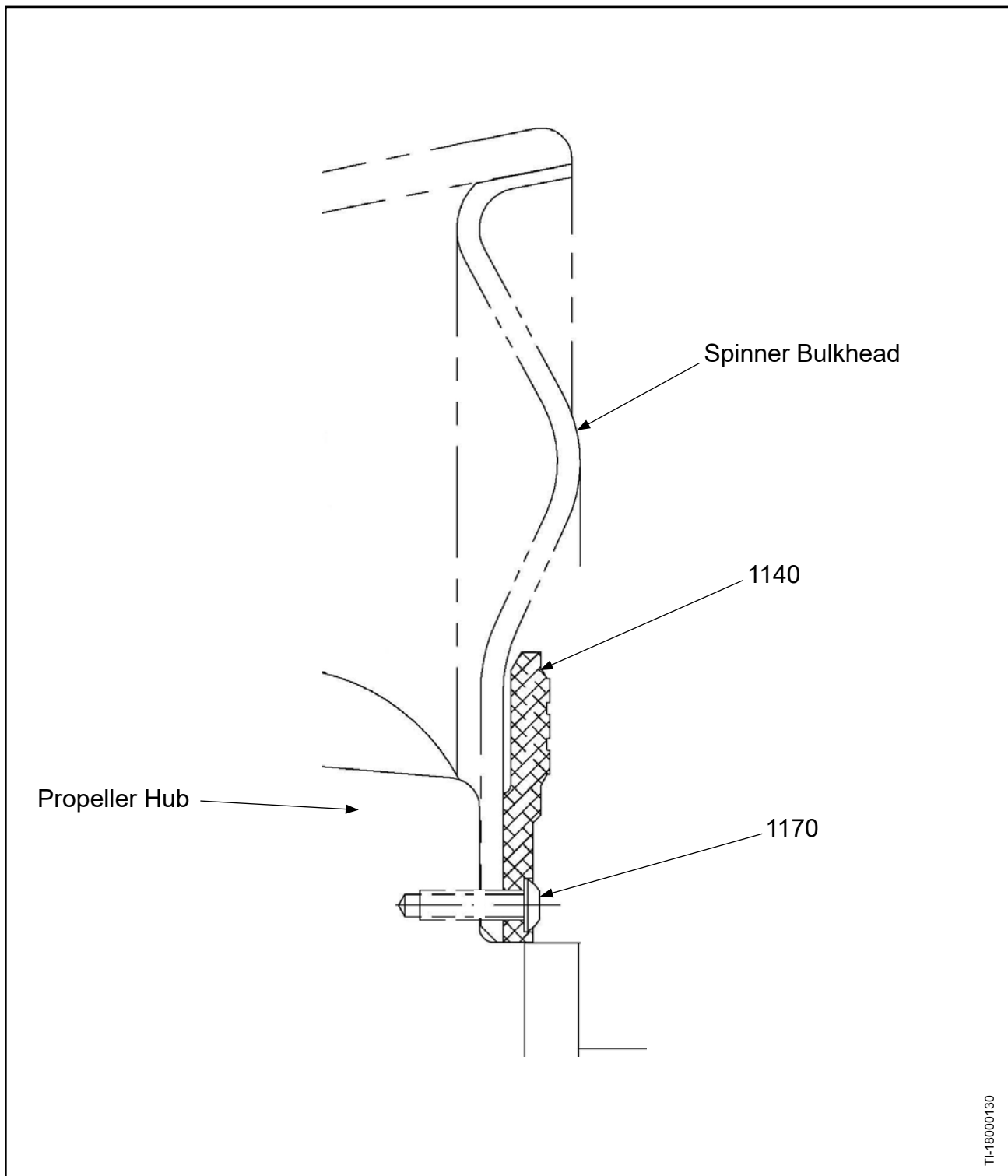
- (11) If applicable, bond the de-ice boot lead wires to the blade in accordance with the De-ice Boot Removal/Installation chapter in this manual.

**NOTE:**    Some de-ice boots are designed with a bent lead strap. Install the de-ice boot in accordance with the De-ice Boot Removal/Installation chapter in this manual.

- (12) Using the screw (220), washers (200 and/or 210) nut (190), attach the terminal strip (170) to the bulkhead in accordance with Figure DD-3 and Figure DD-4.
- (13) Torque the screw (220) to 10-12 In-Lbs (1.1-1.3 N•m).
- (14) Install the slip ring lead wires and de-ice wire harness (890) to the terminal strip (170) in accordance with the configuration specified below:
- (a)    7931-5E2647-1: Typical 3-wire Configuration (Refer to Figure DD-5)
- (b)    7931-67-896-1: Crossfire Configuration A (Refer to Figure DD-6)
- (15) Tighten the terminal screws until snug.
- (16) Install the clamp (590), around the wire harness (890).
- (17) Using the screw (610), washers (620 and/or 630) nut (600), install the clamp (590) to the bulkhead in accordance with Figure DD-4, Figure DD-7, and Figure DD-8. Orient the centerline of the clamp (590) parallel to terminal strip (170).
- (18) Torque the screw (610) to 22-25 In-Lbs (2.48-2.82 N•m).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

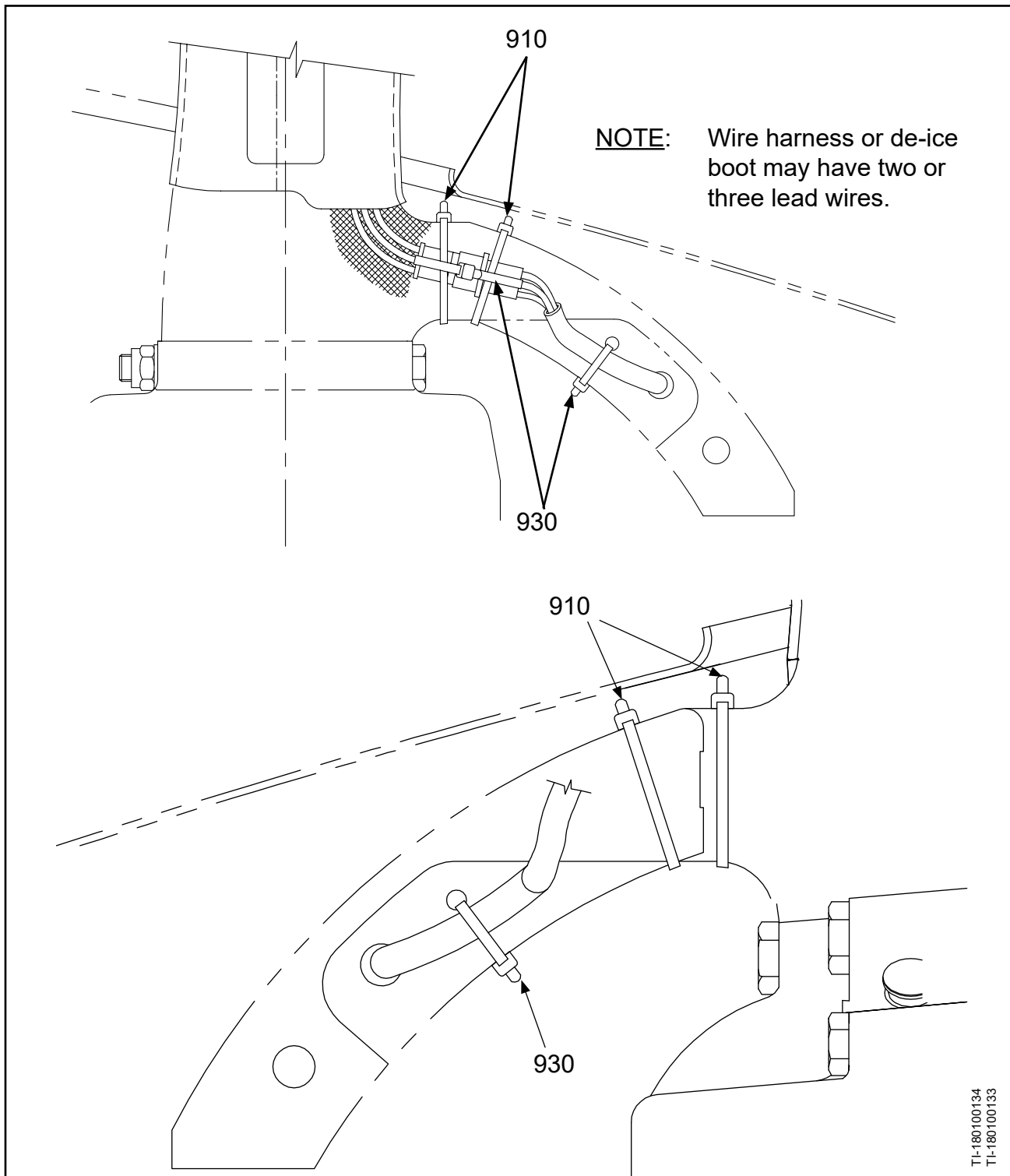
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2647-1 and 7931-67-896-1**



**Slip Ring Mounting  
Figure DD-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

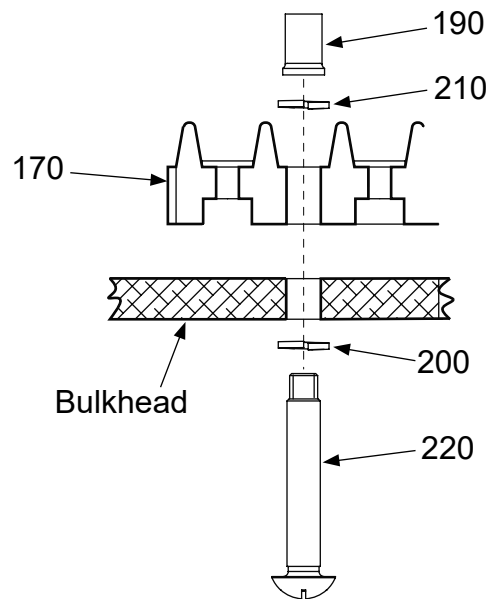
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2647-1 and 7931-67-896-1**



**Wire Harness to Counterweight  
Figure DD-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

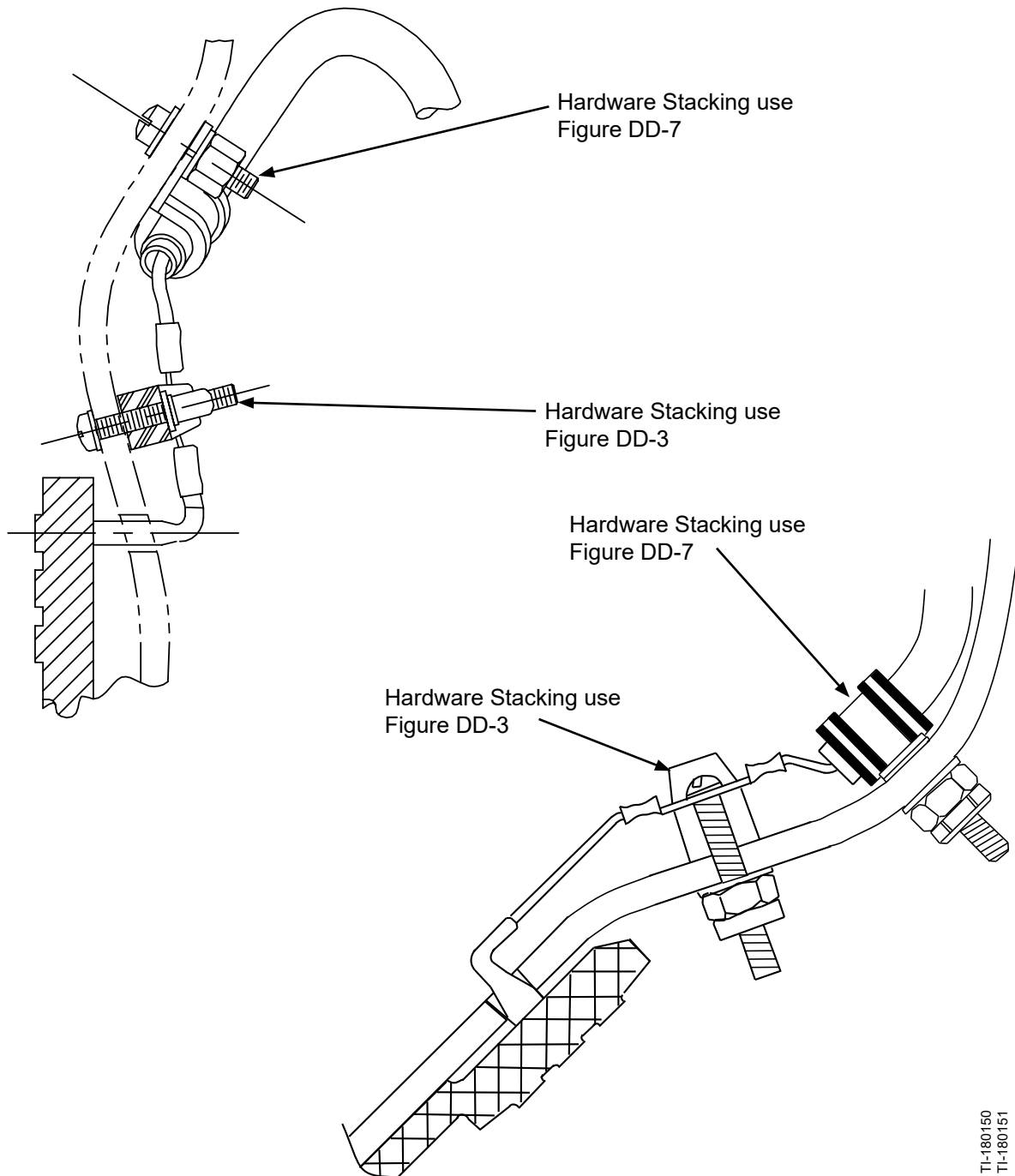
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2647-1 and 7931-67-896-1**



**Terminal Strip Hardware: Bulkhead Mounted  
Figure DD-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2647-1 and 7931-67-896-1**



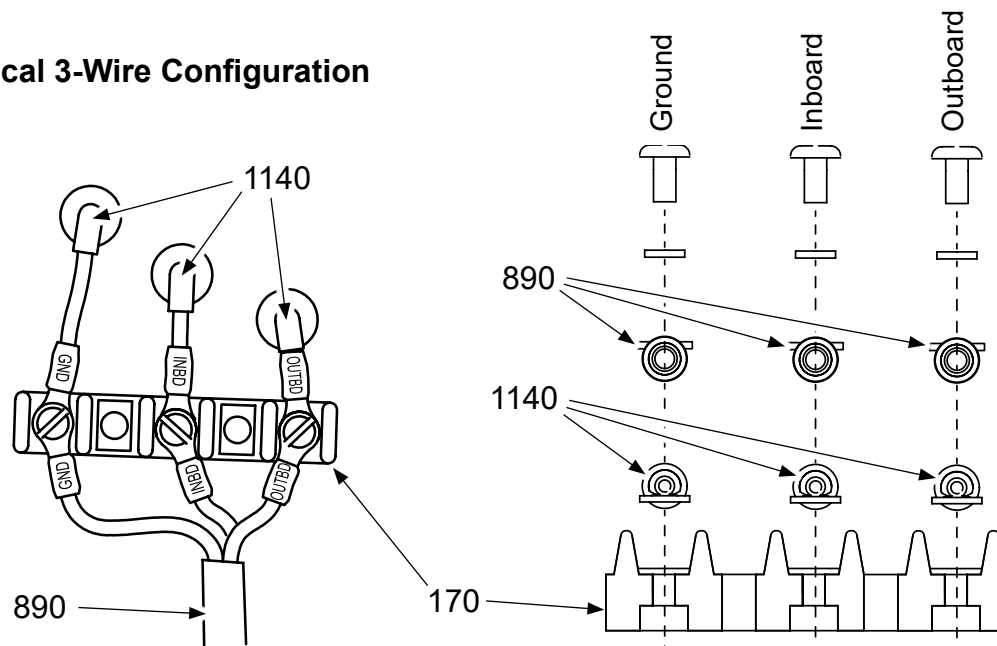
**Terminal Strip and Loop Clamp to Bulkhead Attachment  
Figure DD-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-5E2647-1 and 7931-67-896-1**

**Typical 3-Wire Configuration**



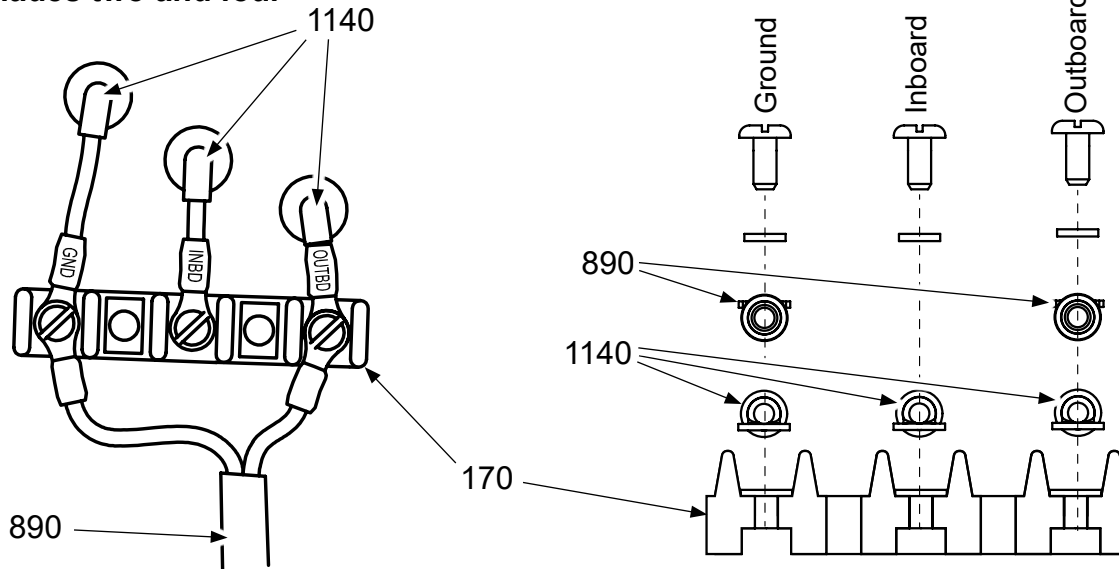
**NOTE:** The illustrations show slip ring wires on a  
typical right-hand (rotation) propeller.

**Terminal Strip Lead Wire Configuration: Typical 3-Wire  
Figure DD-5**

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

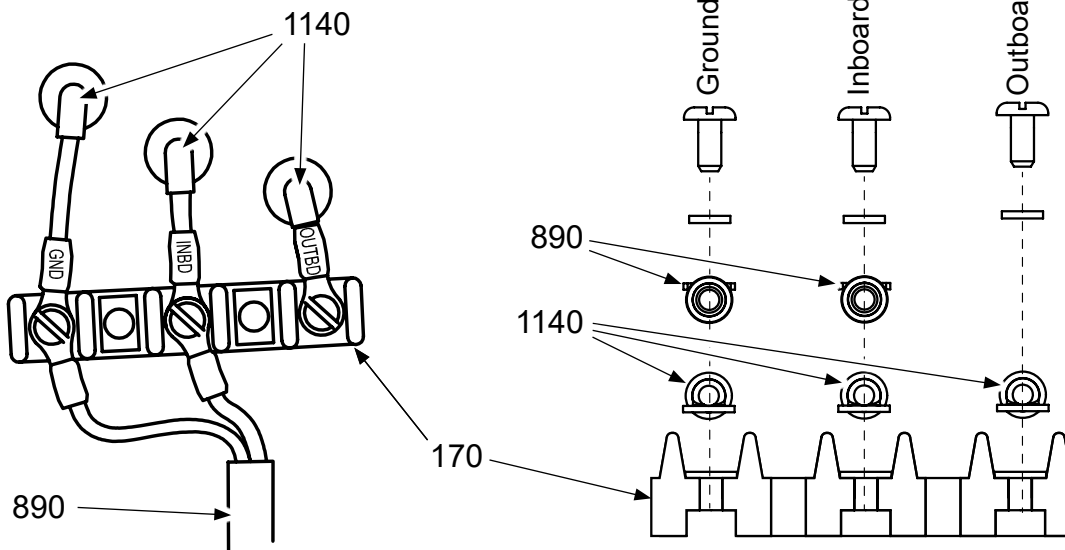
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2647-1 and 7931-67-896-1**

## Blades two and four



**NOTE:** The illustrations show slip ring wires on a typical right-hand (rotation) propeller.

## Blades one and three



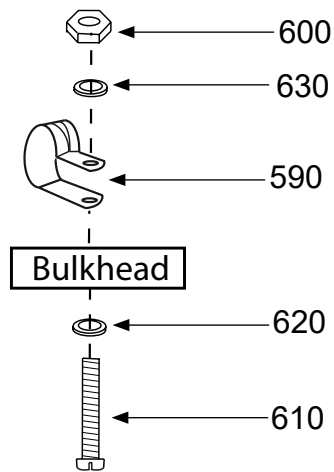
TPI-MB-0133

**Terminal Strip Lead Wire Configuration: Crossfire Configuration A**  
**Figure DD-6**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

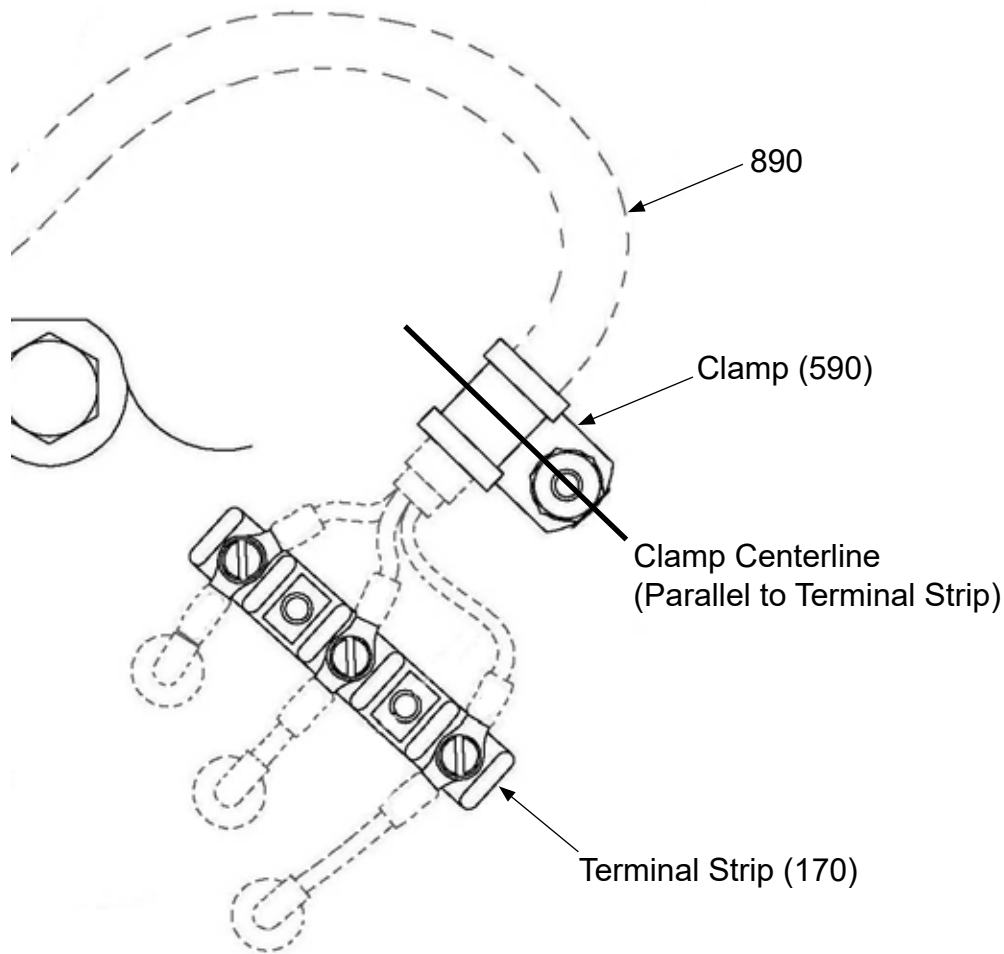
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2647-1 and 7931-67-896-1**



**Loop Clamp to Bulkhead Hardware Configurations  
Figure DD-7**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2647-1 and 7931-67-896-1**



**NOTE:** This figure illustrates the orientation of the clamp to the terminal strip.  
Wire harness/slip ring wires are shown for reference only.  
Actual wire harness may have two or three wires.

TPI-MB-0310

**Loop Clamp Orientation  
Figure DD-8**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2647-1 and 7931-67-896-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-5E2647-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11DD FIGURES: DD-1 thru DD-5, DD-7, and DD-8</b>		
170	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY ITEM 170A	4	
170A	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES ITEM 170	4	
190	7931-2E1365	• TAPPED EYELET SUPERSEDED BY ITEM 190A	8	Y
190A	2H1365	• TAPPED EYELET SUPERSEDES ITEM 190	8	Y
200	B-3837-N616	• WASHER, CORROSION RESISTANT	8	Y
210	B-3854-41	• WASHER, LOCK	8	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	8	Y
590	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	4	Y
600	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
610	B-3856-248	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
620	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
630	B-3854-42	• WASHER, LOCK	4	Y
890	7931-4E2369-5	• DE-ICE WIRE HARNESS SUPERSEDED BY ITEM 890A	4	Y
890A	4H2369-5	• DE-ICE WIRE HARNESS SUPERSEDES ITEM 890	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	8	Y
1140	7931-4E2661-1	• SLIP RING ASSEMBLY SUPERSEDED BY ITEM 1140A		1
1140A	4H2661-1	• SLIP RING ASSEMBLY SUPERSEDES ITEM 1140	1	
1170	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	8	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 7931-5E2647-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2647-1 and 7931-67-896-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-896-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) SUPERSEDED BY 106308, POST HC-SB-30-366 INSTALLATION INSTRUCTION 11DD FIGURES: DD-1 thru DD-4, and DD-6 thru DD-8</b>		
170	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES ITEM 170A	4	
170A	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY ITEM 170	4	
190	2H1365	• TAPPED EYELET SUPERSEDES ITEM 190A	8	Y
190A	7931-2E1365	• TAPPED EYELET SUPERSEDED BY ITEM 190	8	Y
200	B-3854-41	• WASHER, LOCK	8	Y
210	B-3837-N616	• WASHER, CORROSION RESISTANT	8	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	8	Y
590	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	4	Y
600	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
610	B-3856-248	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
620	B-3854-42	• WASHER, LOCK	4	Y
630	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
890	3H2383-4	• DE-ICE WIRE HARNESS SUPERSEDES ITEM 890A	4	Y
890A	7931-3E2383-4	• DE-ICE WIRE HARNESS SUPERSEDED BY ITEM 890	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	8	Y
1140	4H2661-1	• SLIP RING ASSEMBLY SUPERSEDES ITEM 1140A	1	
1140A	7931-4E2661-1	• SLIP RING ASSEMBLY SUPERSEDED BY ITEM 1140	1	
1170	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	8	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 7931-67-896-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2702-1, 7931-5E2729-1, 7931-67-870-1, and 7931-67-932-1**

**DE. Installation Instruction 11DE**

- (1) Using the screws (1170), attach the slip ring (1140) and the bulkhead to the hub as shown in Figure DE-1.
  - (a) Torque each screw (1170) 96-120 In-Lbs (10.1-13.5 N•m).
  - (b) Perform slip ring run-out check in accordance with the Check chapter in this manual.
- (2) Position the propeller blades at reverse blade angle.
- (3) Assemble the plug connection between the wire harness (890) and the de-ice boot.
- (4) Install the tie strap (930) around the wire harness/de-ice boot plug connection.
- (5) Position the tie strap head (930) in approximate location shown in Figure DE-2.
- (6) Route the terminal end of the wire harness (890) through the hole in counterweight rib, as shown in Figure DE-2.
- (7) Secure the wire harness/boot connection to the counterweight.
  - (a) Install tie straps (910) under the tie strap (930) connecting the wire harness/boot plugs, and around the counterweight as shown in Figure DE-2.
  - (b) Position the tie strap heads in the approximate location on the side of the counterweight as shown in Figure DE-2.
    - 1 Do not tighten the tie straps (910) at this time.
- (8) Verify that the wire harness (890) is taut through the counterweight hole.
- (9) Secure the wire harness (890) to the counterweight by installing the tie strap (930) through the counterweight hole and over the wire harness (890) on both sides of the counterweight. Position the tie strap head in the approximate location shown in Figure DE-2.
- (10) Tighten all of the tie straps (910 and 930).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2702-1, 7931-5E2729-1, 7931-67-870-1, and 7931-67-932-1**

**DE. Installation Instruction 11DE - continued**

- (11) Secure the de-ice boot lead wires to the blade. Use instruction (11)(a) or (11)(b).

**NOTE:** Some de-ice boots are designed with a bent lead strap. Install the de-ice boot in accordance with the De-ice Boot Removal/Installation chapter in this manual.

- (a) If applicable, bond the de-ice boot lead wires to the blade in accordance with the De-ice Boot Removal/Installation chapter in this manual.
- (b) Using tie straps (910) and (930):
- 1 If the de-ice boot has a bent lead strap, installation of tie straps (910) to secure the de-ice boot wires to the blade shank is not required.
  - 2 If applicable, bond the de-ice boot lead wires to the blade in accordance with the De-ice Boot Removal/Installation chapter in this manual.
  - 3 Join two tie straps (910).
  - 4 Install the joined tie straps (910) around the blade to secure the de-ice boot wires to the blade shank in accordance with Figure DE-2.
  - 5 Install two tie straps (930) to secure the tie straps (910) in position in accordance with Figure DE-2.
- (12) Using the screw (220), washers (200 and/or 210), and tapped eyelet (190), attach the terminal strip (170) to the bulkhead in accordance with Figure DE-3 and Figure DE-4.
- (13) Torque the screw (220) to 10-12 In-Lbs (1.1-1.3 N•m).
- (14) Install the slip ring lead wires and de-ice wire harness (890) to the terminal strip (170) in accordance with the the configuration specified below:
- (a) 7931-5E2702-1: Typical 3-wire Configuration (Refer to Figure DE-5)
  - (b) 7931-5E2729-1: Typical 3-wire Configuration (Refer to Figure DE-5)
  - (c) 7931-67-870-1: Crossfire Configuration B (Refer to Figure DE-6)
  - (d) 7931-67-932-1: Typical 3-wire Configuration (Refer to Figure DE-5)
- (15) Tighten the terminal screws until snug.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

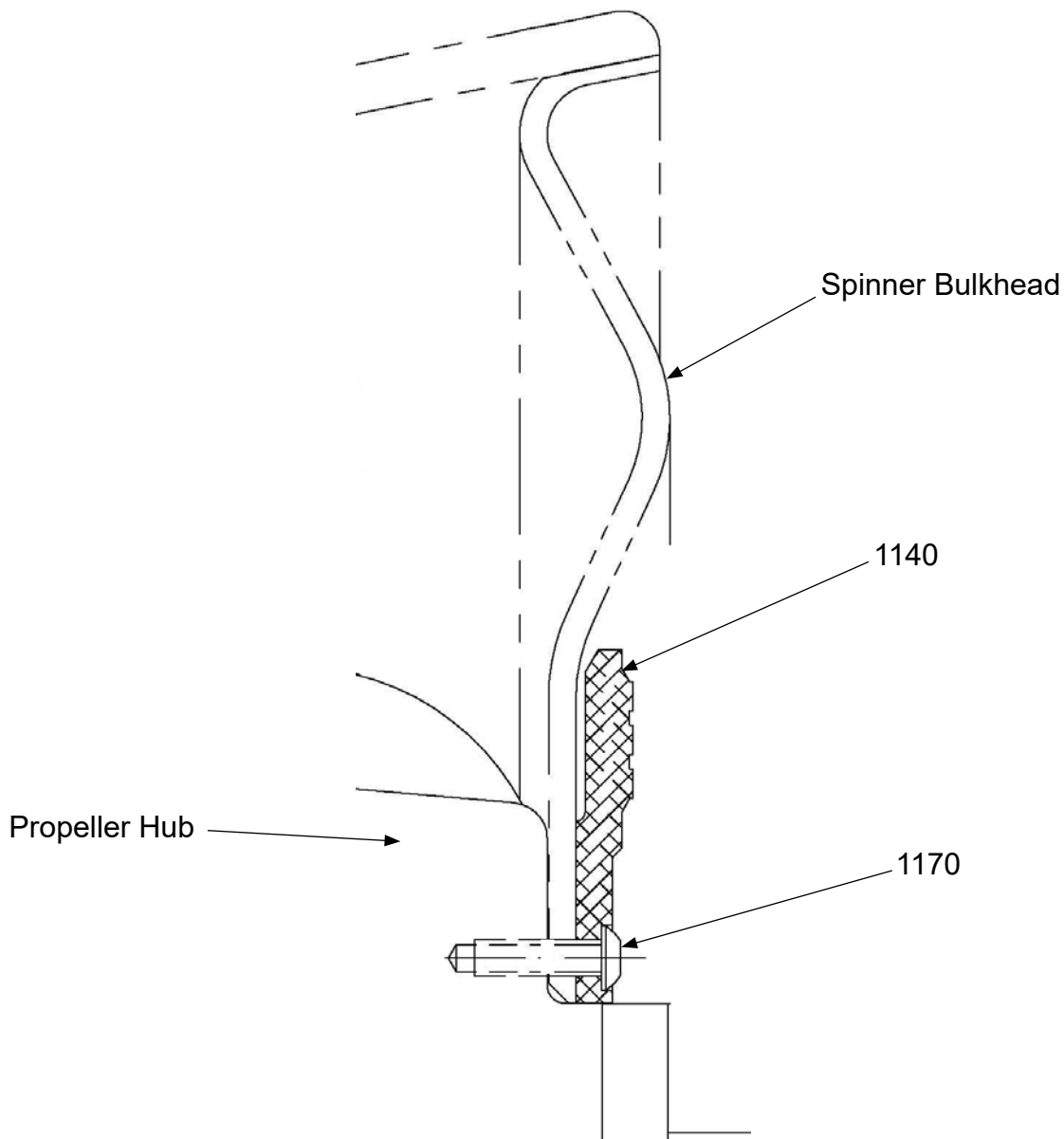
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2702-1, 7931-5E2729-1, 7931-67-870-1, and 7931-67-932-1**

DE. Installation Instruction 11DE - continued

- (16) Install the clamp (590), around the wire harness (890).
- (17) Using the screw (610), washers (620 and/or 630) nut (600), install the clamp (590) to the bulkhead in accordance with Figure DE-7, Figure DE-4, and Figure DE-8.
  - (a) Orient the centerline of the clamp (590) parallel to terminal strip (170).
- (18) Torque the screw (610) to 22-25 In-Lbs (2.48-2.82 N•m).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2702-1, 7931-5E2729-1, 7931-67-870-1, and 7931-67-932-1**



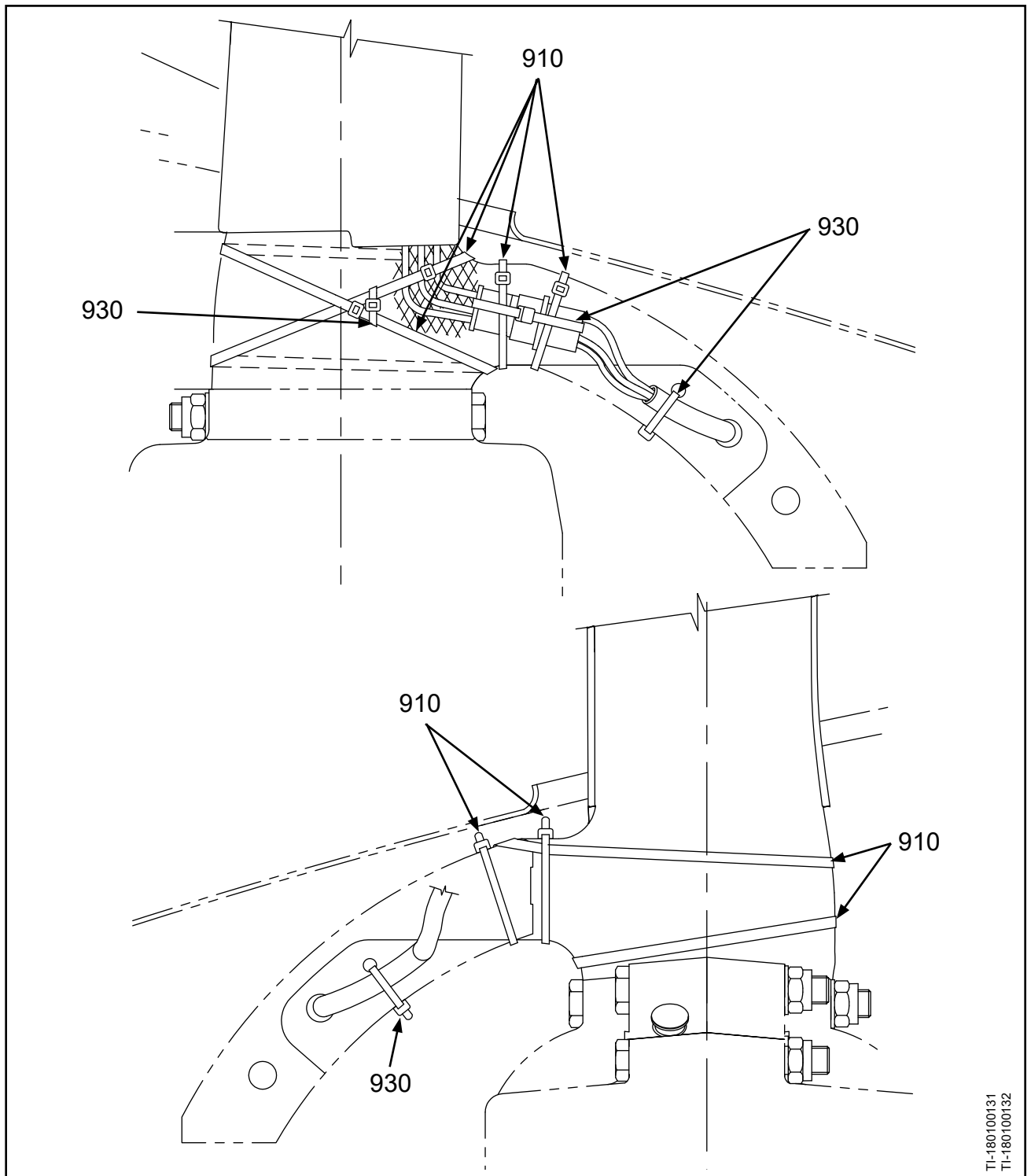
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**Slip Ring Mounting  
Figure DE-1**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

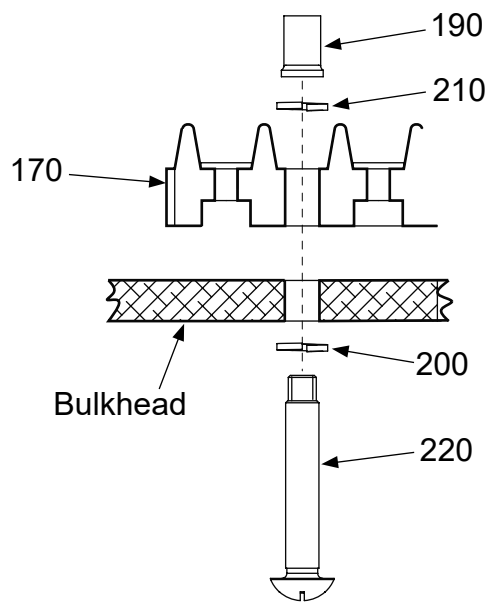
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2702-1, 7931-5E2729-1, 7931-67-870-1, and 7931-67-932-1**



**Wire Harness to Counterweight  
Figure DE-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

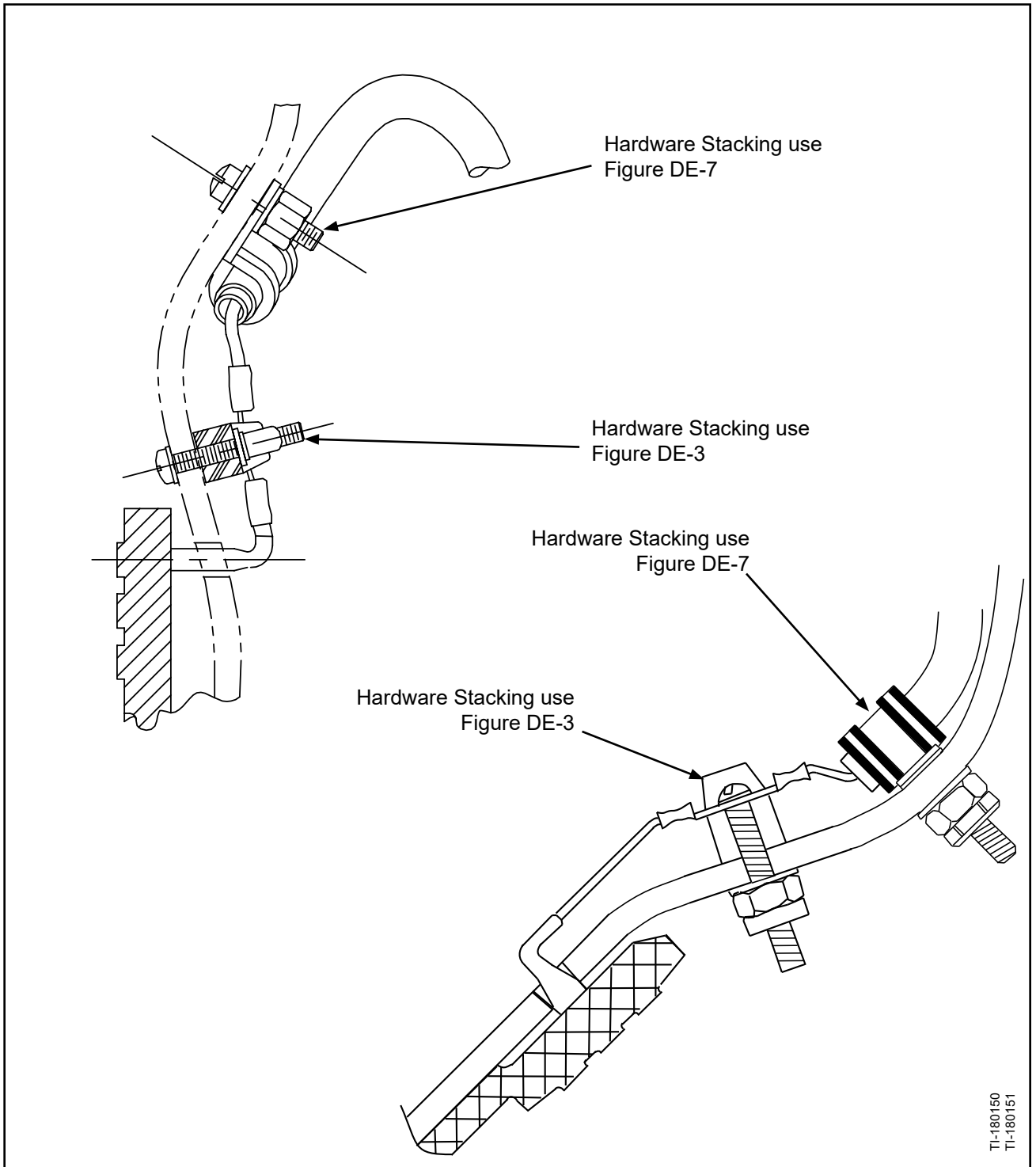
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2702-1, 7931-5E2729-1, 7931-67-870-1, and 7931-67-932-1**



**Terminal Strip Hardware: Bulkhead Mounted  
Figure DE-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2702-1, 7931-5E2729-1, 7931-67-870-1, and 7931-67-932-1**

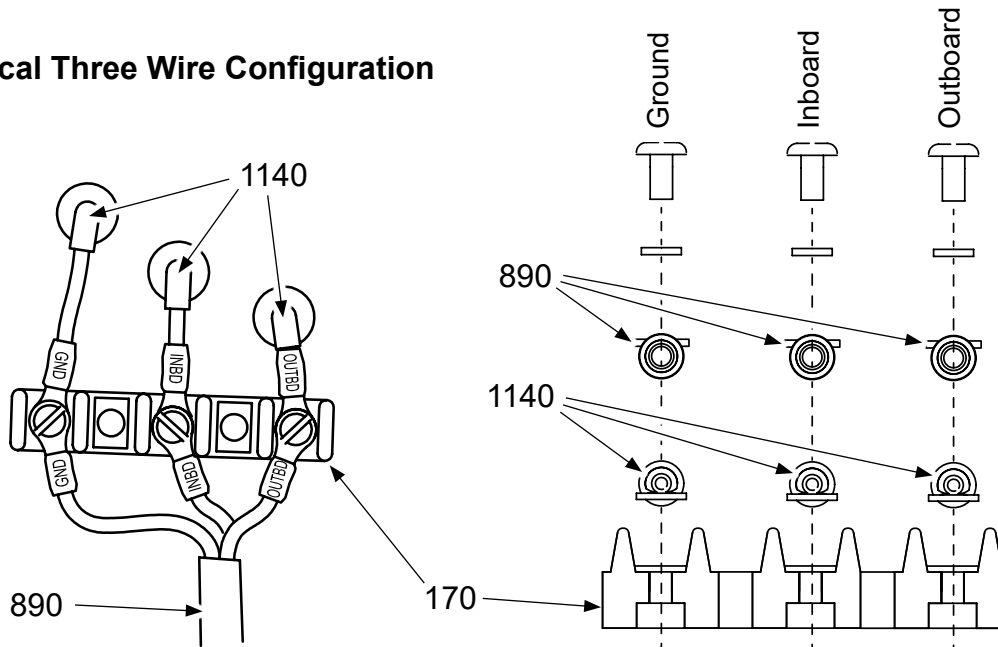


**Terminal Strip and Loop Clamp to Bulkhead Attachment  
Figure DE-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2702-1, 7931-5E2729-1, 7931-67-870-1, and 7931-67-932-1**

**Typical Three Wire Configuration**



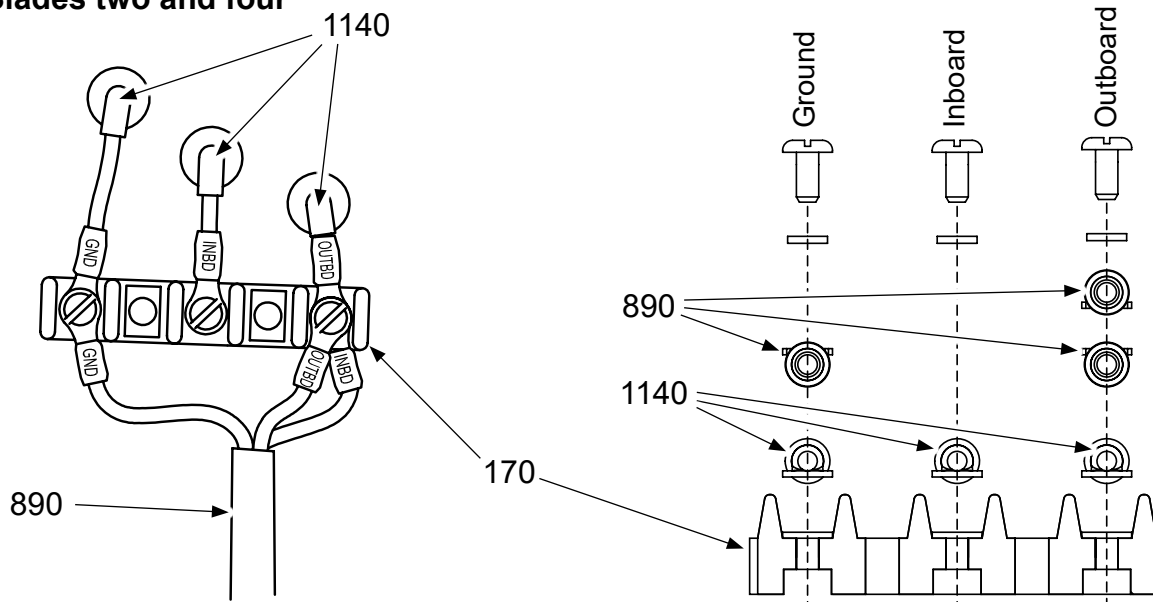
**NOTE:** The illustrations show slip ring wires on a typical right-hand (rotation) propeller.

**Terminal Strip Lead Wire Configuration: Typical 3-Wire  
Figure DE-5**

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

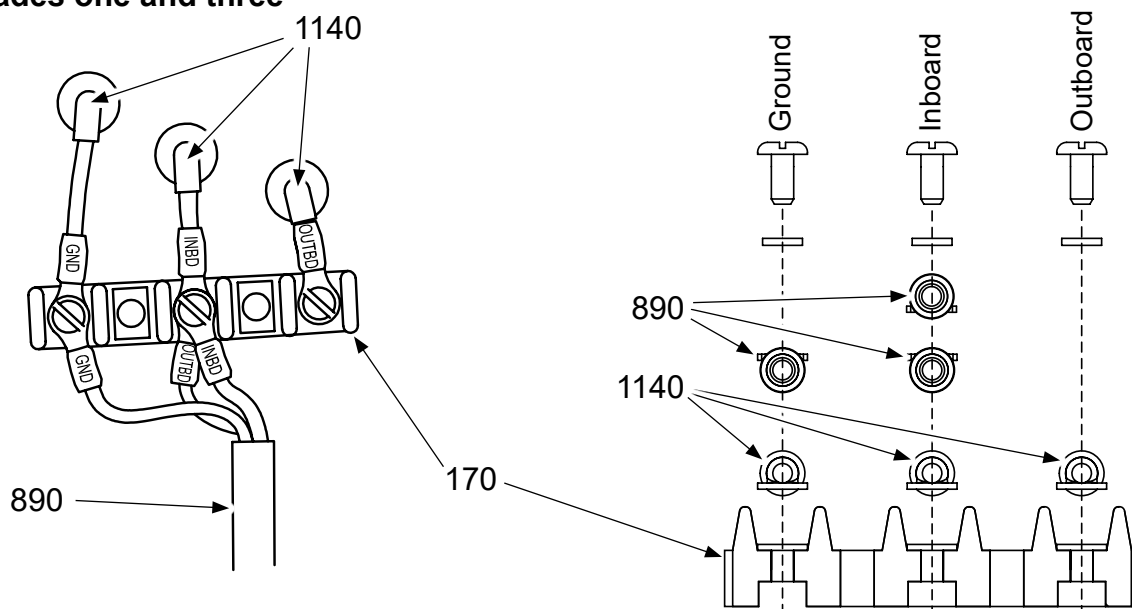
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2702-1, 7931-5E2729-1, 7931-67-870-1, and 7931-67-932-1**

## Blades two and four



**NOTE:** The illustrations show slip ring wires on a typical right-hand (rotation) propeller.

## Blades one and three



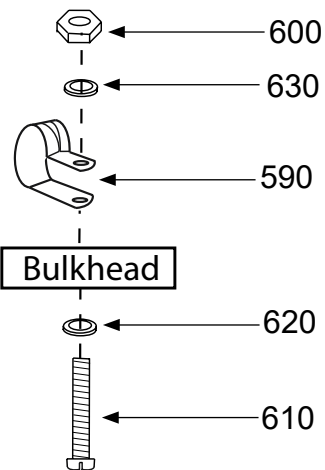
## Crossfire Configuration B

**Terminal Strip Lead Wire Configuration: Crossfire Configuration B**  
**Figure DE-6**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2702-1, 7931-5E2729-1, 7931-67-870-1, and 7931-67-932-1**

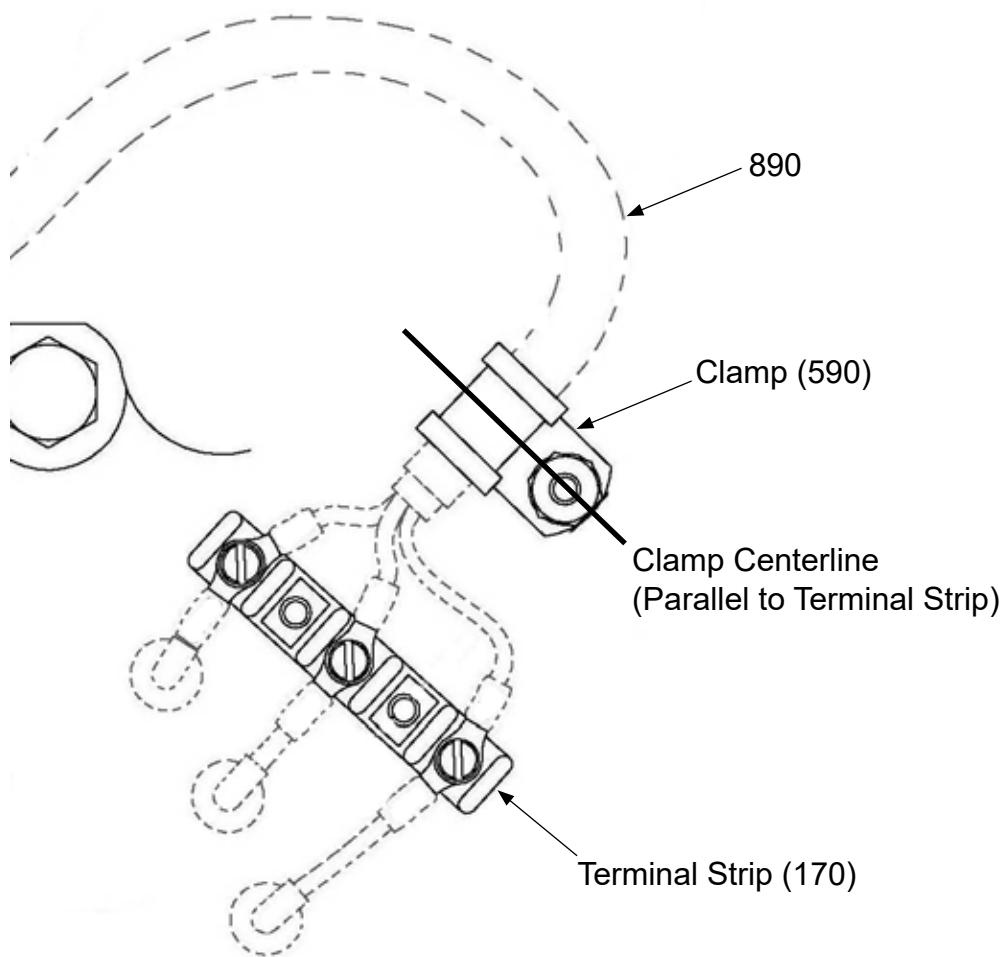
**Configuration AC**



**Loop Clamp to Bulkhead Hardware Configurations  
Figure DE-7**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2702-1, 7931-5E2729-1, 7931-67-870-1, and 7931-67-932-1**



**NOTE:** This figure illustrates the orientation of the clamp to the terminal strip. Wire harness/slip ring wires are shown for reference only. Actual wire harness may have two or three wires.

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**Loop Clamp Orientation  
Figure DE-8**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2702-1, 7931-5E2729-1, 7931-67-870-1, and 7931-67-932-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-5E2702-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11DE FIGURES: DE-1 thru DE-5, DE-7, and DE-8</b>		
170	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY ITEM 170A	4	
170A	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES ITEM 170	4	
190	7931-2E1365	• TAPPED EYELET SUPERSEDED BY ITEM 190A	8	Y
190A	2H1365	• TAPPED EYELET SUPERSEDES ITEM 190	8	Y
200	B-3854-41	• WASHER, LOCK	8	Y
210	B-3854-41	• WASHER, LOCK	8	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	8	Y
590	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	4	Y
600	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
610	B-3856-248	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
620	B-3854-42	• WASHER, LOCK	4	Y
630	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
890	7931-4E2369-6	• DE-ICE WIRE HARNESS SUPERSEDED BY ITEM 890A	4	Y
890A	4H2369-6	• DE-ICE WIRE HARNESS SUPERSEDES ITEM 890	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	16	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	12	Y
1140	7931-4E2661-1	• SLIP RING ASSEMBLY SUPERSEDED BY ITEM 1140A	1	
1140A	4H2661-1	• SLIP RING ASSEMBLY SUPERSEDES ITEM 1140	1	
1170	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	8	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 7931-5E2702-1**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2702-1, 7931-5E2729-1, 7931-67-870-1, and 7931-67-932-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-5E2729-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11DE FIGURES: DE-1 thru DE-5, DE-7, and DE-8</b>		
170	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY ITEM 170A	4	
170A	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES ITEM 170	4	
190	7931-2E1365	• TAPPED EYELET SUPERSEDED BY ITEM 190A	8	Y
190A	2H1365	• TAPPED EYELET SUPERSEDES ITEM 190	8	Y
200	B-3854-41	• WASHER, LOCK	8	Y
210	B-3854-41	• WASHER, LOCK	8	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	8	Y
590	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	4	Y
600	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
610	B-3856-248	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
620	B-3854-42	• WASHER, LOCK	4	Y
630	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
890	7931-4E2369-4	• DE-ICE WIRE HARNESS SUPERSEDED BY ITEM 890A	4	Y
890A	4H2369-4	• DE-ICE WIRE HARNESS SUPERSEDES ITEM 890	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	16	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	12	Y
1140	7931-4E2661-1	• SLIP RING ASSEMBLY SUPERSEDED BY ITEM 1140A	1	
1140A	4H2661-1	• SLIP RING ASSEMBLY SUPERSEDES ITEM 1140	1	
1170	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	8	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 7931-5E2729-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2702-1, 7931-5E2729-1, 7931-67-870-1, and 7931-67-932-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-870-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11DE FIGURES: DE-1 thru DE-4, and DE-6 thru DE-8</b>		
170	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY ITEM 170A	4	
170A	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES ITEM 170	4	
190	7931-2E1365	• TAPPED EYELET SUPERSEDED BY ITEM 190A	8	Y
190A	2H1365	• TAPPED EYELET SUPERSEDES ITEM 190	8	Y
200	B-3854-41	• WASHER, LOCK	8	Y
210	B-3854-41	• WASHER, LOCK	8	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	8	Y
590	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	4	Y
600	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
610	B-3856-248	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
620	B-3854-42	• WASHER, LOCK	4	Y
630	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
890	7931-4E2369-5	• DE-ICE WIRE HARNESS SUPERSEDED BY ITEM 890A	4	Y
890A	4H2369-5	• DE-ICE WIRE HARNESS SUPERSEDES ITEM 890	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	16	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	12	Y
1140	7931-4E2661-1	• SLIP RING ASSEMBLY SUPERSEDED BY ITEM 1140A	1	
1140A	4H2661-1	• SLIP RING ASSEMBLY SUPERSEDES ITEM 1140	1	
1170	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	8	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 7931-67-870-1**

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2702-1, 7931-5E2729-1, 7931-67-870-1, and 7931-67-932-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-932-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11DE FIGURES: DE-1 thru DE-5, DE-7, and DE-8</b>		
170	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES ITEM 170A	4	
170A	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY ITEM 170	4	
190	2H1365	• TAPPED EYELET SUPERSEDES ITEM 190A	8	Y
190A	7931-2E1365	• TAPPED EYELET SUPERSEDED BY ITEM 190	8	Y
200	B-3854-41	• WASHER, LOCK	8	Y
210	B-3854-41	• WASHER, LOCK	8	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	8	Y
590	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	4	Y
600	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
610	B-3856-248	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
620	B-3854-42	• WASHER, LOCK	4	Y
630	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
890	7931-4E2369-4	• DE-ICE WIRE HARNESS SUPERSEDED BY ITEM 890A	4	Y
890A	4H2369-4	• DE-ICE WIRE HARNESS SUPERSEDES ITEM 890	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	16	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	12	Y
1140	7931-4E2661-1	• SLIP RING ASSEMBLY SUPERSEDED BY ITEM 1140A	1	
1140A	4H2661-1	• SLIP RING ASSEMBLY SUPERSEDES ITEM 1140	1	
1170	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	8	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 7931-67-932-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2702-1, 7931-5E2729-1, 7931-67-870-1, and 7931-67-932-1**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-5E2767-1, 7931-67-835-1, and 7931-67-933-1**

**DF.    Installation Instruction 11DF**

- (1) Using the screws (1170), attach the slip ring (1140) and the bulkhead to the hub as shown in Figure DF-1.
  - (a) Torque each screw (1170) 96-120 In-Lbs (10.1-13.5 N•m).
  - (b) Perform slip ring run-out check in accordance with the Check chapter in this manual.
- (2) Position the propeller blades at reverse blade angle.
- (3) Assemble the plug connection between the wire harness (890) and the de-ice boot.
- (4) Install the tie strap (930) around the wire harness/de-ice boot plug connection.
- (5) Position the tie strap head (930) in approximate location shown in Figure DF-2.
- (6) Route the terminal end of the wire harness (890) through the hole in counterweight rib, as shown in Figure DF-2.
- (7) Secure the wire harness/boot connection to the counterweight.
  - (a) Install tie straps (910) under the tie strap (930) connecting the wire harness/boot plugs, and around the counterweight as shown in Figure DF-2.
  - (b) Position the tie strap head in the approximate location on the side of the counterweight as shown in Figure DF-2. Do not tighten the tie strap (910) at this time.
- (8) Verify that the wire harness (890) is taut through the counterweight hole.
- (9) Secure the wire harness (890) to the counterweight by installing the tie strap (930) around the wire harness (890) on both sides of the counterweight. Position the tie strap head in the approximate location shown in Figure DF-2.
- (10) Tighten all of the tie straps (910 and 930).
- (11) Position the terminal strip (170) on the bulkhead in accordance with Orientation B in Figure DF-3.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-5E2767-1, 7931-67-835-1, and 7931-67-933-1**

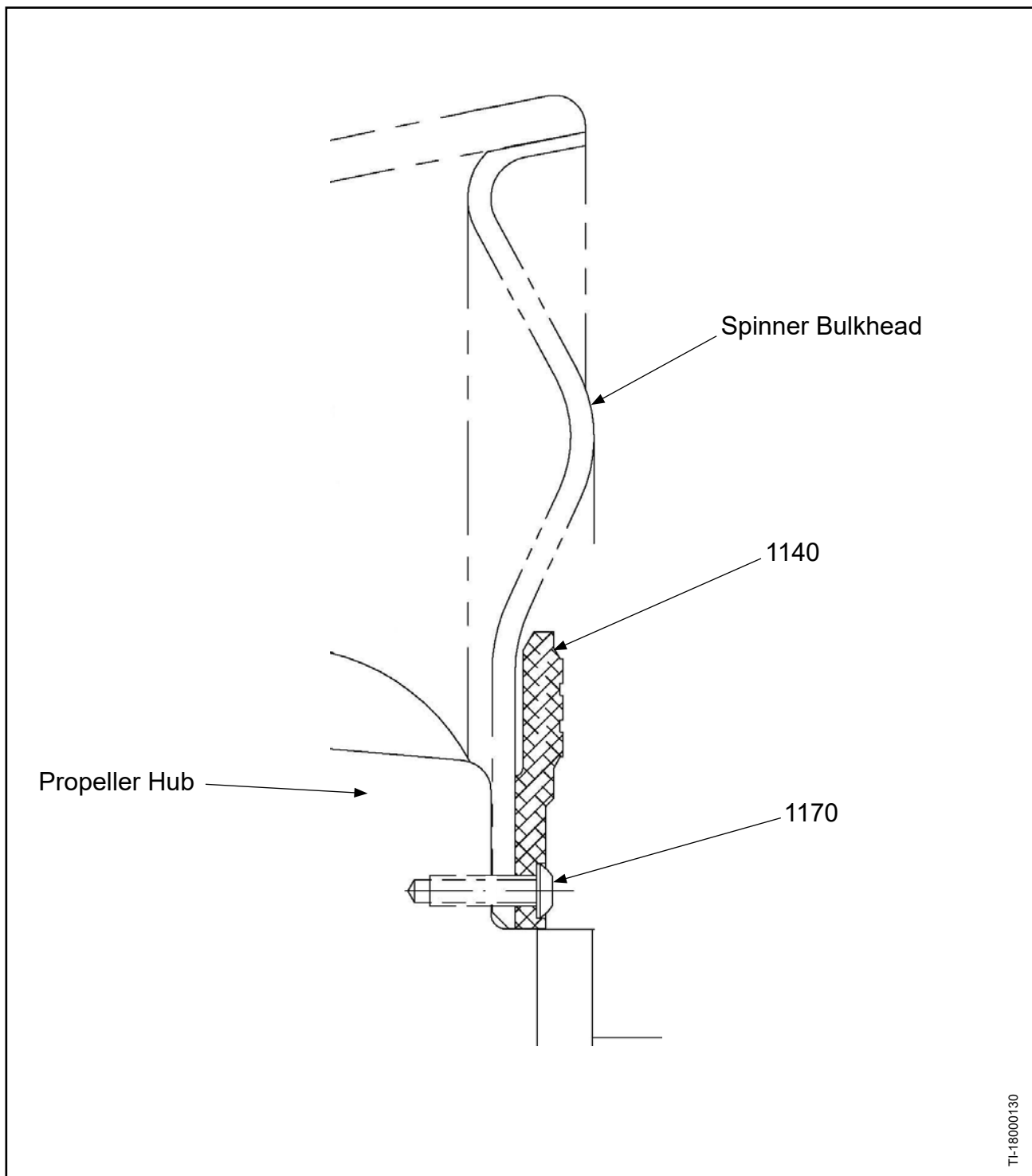
**DF. Installation Instruction 11DF - continued**

- (12) Using the screw (220), washers (200 and/or 210), and nut (190), attach the terminal strip (170) to the bulkhead in accordance with Figure DF-4, and the configuration specified below:
  - (a) 7931-5E2767-1: Configuration A
  - (b) 7931-67-835-1: Configuration B
  - (c) 7931-67-933-1: Configuration A
- (13) Torque the screw (220) to 10-12 In-Lbs (1.1-1.3 N•m).
- (14) Install the slip ring lead wires and de-ice wire harness (890) to the terminal strip (170) in accordance with Figure DF-5.
- (15) Tighten the terminal screws until snug.
- (16) Install the clamp (590), around the wire harness (890) as shown in Figure DF-6 and Figure DF-7.
  - (a) Orient the centerline of the clamp (590) parallel to terminal strip (170) as shown in Figure DF-7.
- (17) Using the screw (610), washers (620 and 630), and nut (600), attach the clamp (590) to the bulkhead in accordance with Figure DF-8. and the configuration specified below:
  - (a) 7931-5E2767-1: Configuration C
  - (b) 7931-67-835-1: Configuration B
  - (c) 7931-67-933-1: Configuration A
- (18) Torque the screw (610) to 22-25 In-Lbs (2.48-2.82 N•m).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-5E2767-1, 7931-67-835-1, and 7931-67-933-1**



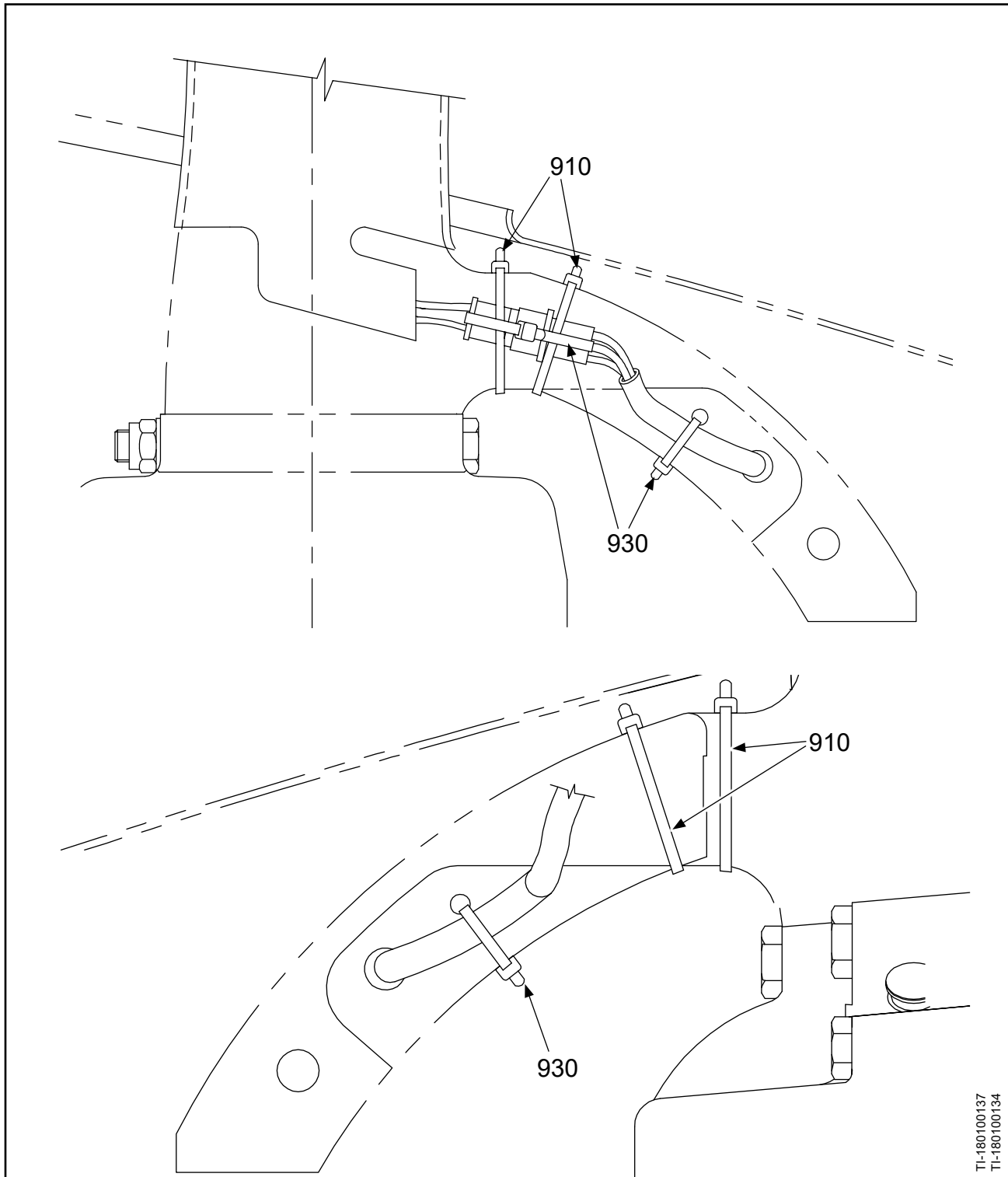
**Slip Ring Mounting  
Figure DF-1**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-5E2767-1, 7931-67-835-1, and 7931-67-933-1**

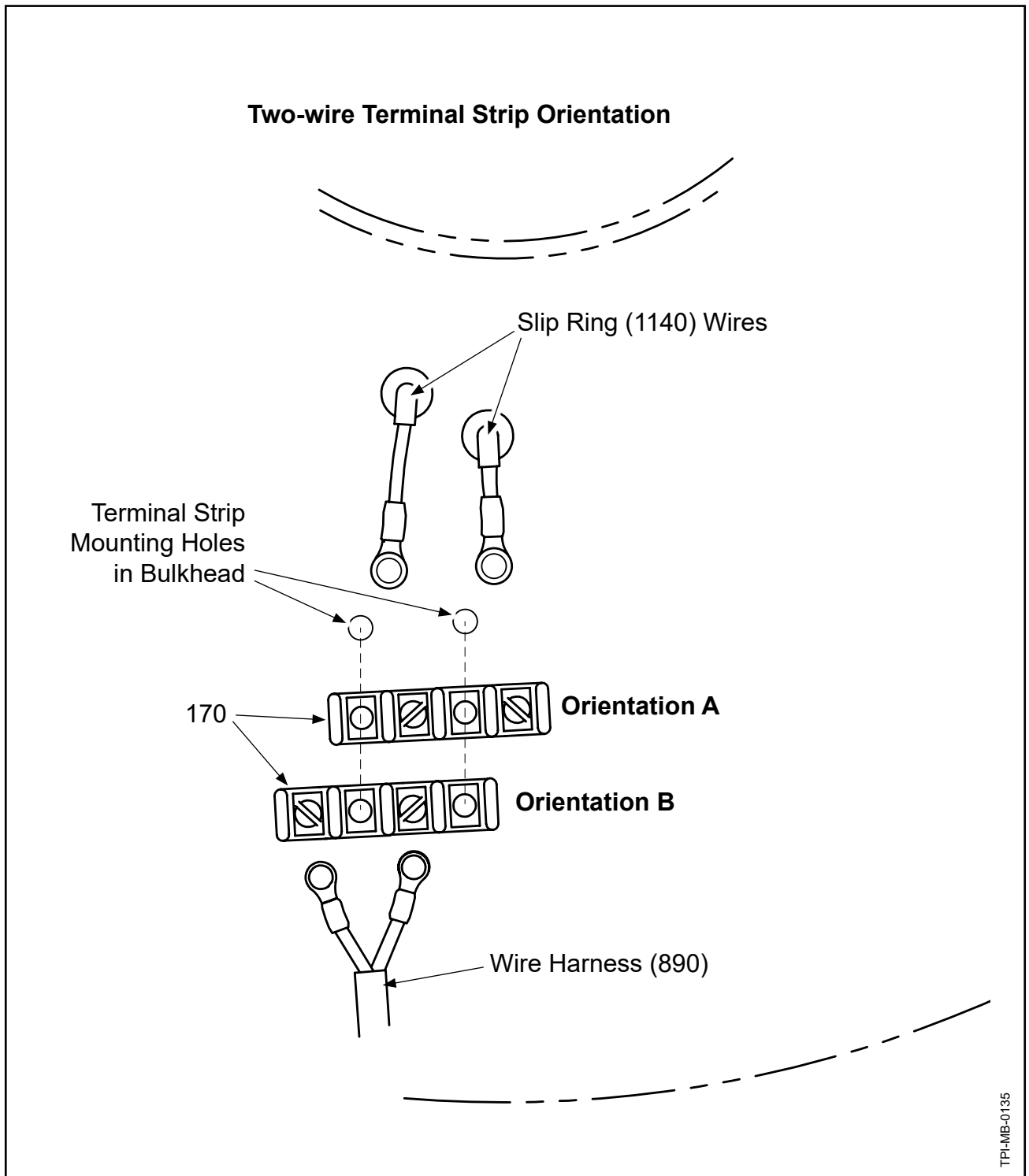


**Wire Harness to Counterweight  
Figure DF-2**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2767-1, 7931-67-835-1, and 7931-67-933-1**

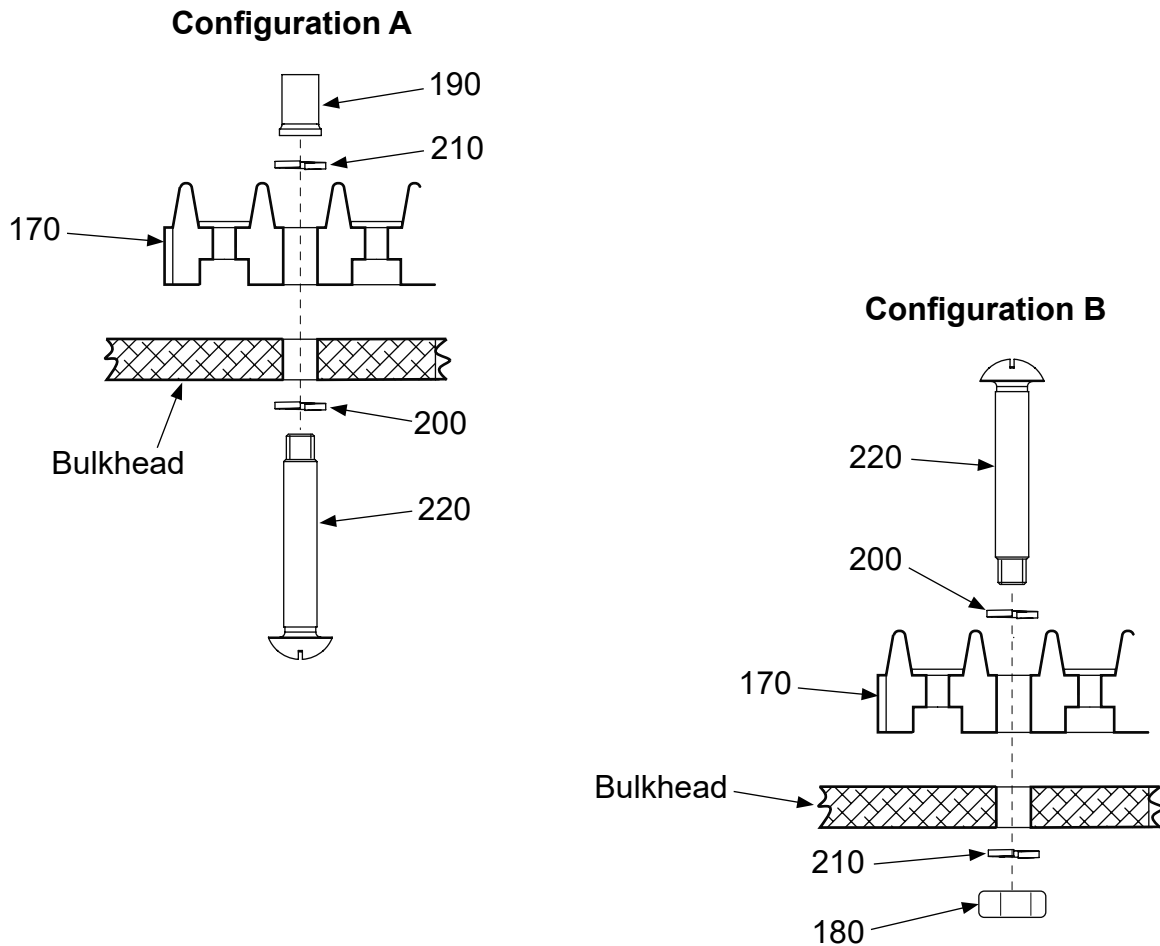


**2-wire Terminal Strip Orientation  
Figure DF-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-5E2767-1, 7931-67-835-1, and 7931-67-933-1**



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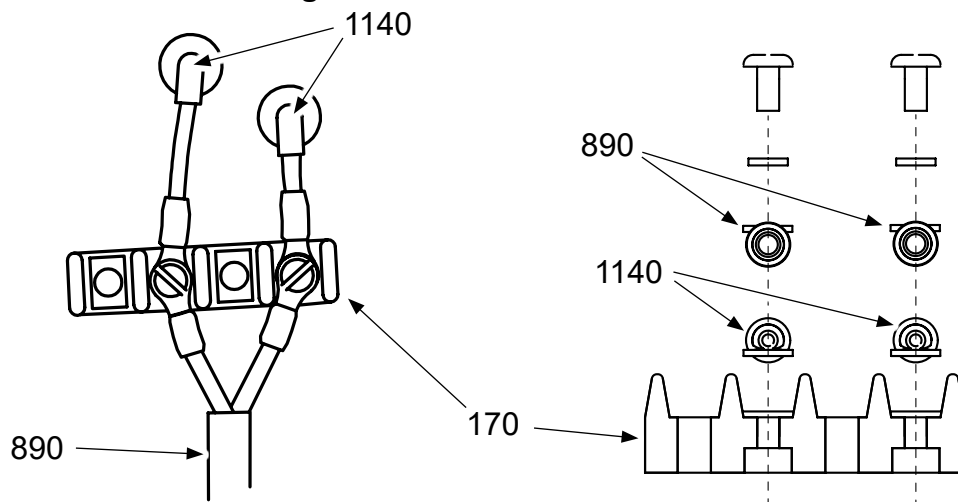
**Terminal Strip Hardware Configurations: Bulkhead Mounted  
Figure DF-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-5E2767-1, 7931-67-835-1, and 7931-67-933-1**

**Typical Two-wire Configuration**



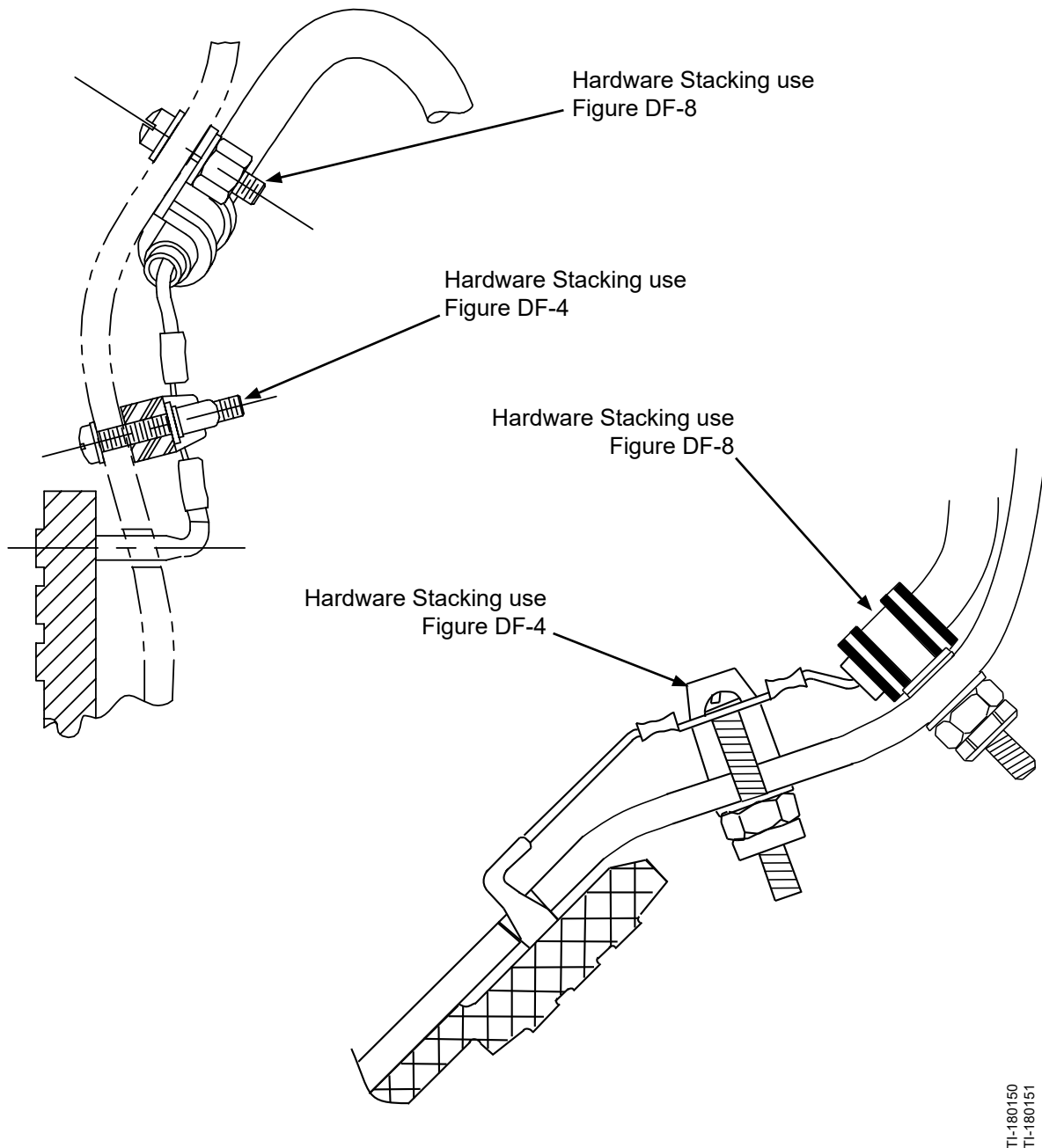
**NOTE:** The illustrations show slip ring wires on a typical right-hand (rotation) propeller.

**Terminal Strip Lead Wire Configuration: Bulkhead Mounted  
Figure DF-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-5E2767-1, 7931-67-835-1, and 7931-67-933-1**

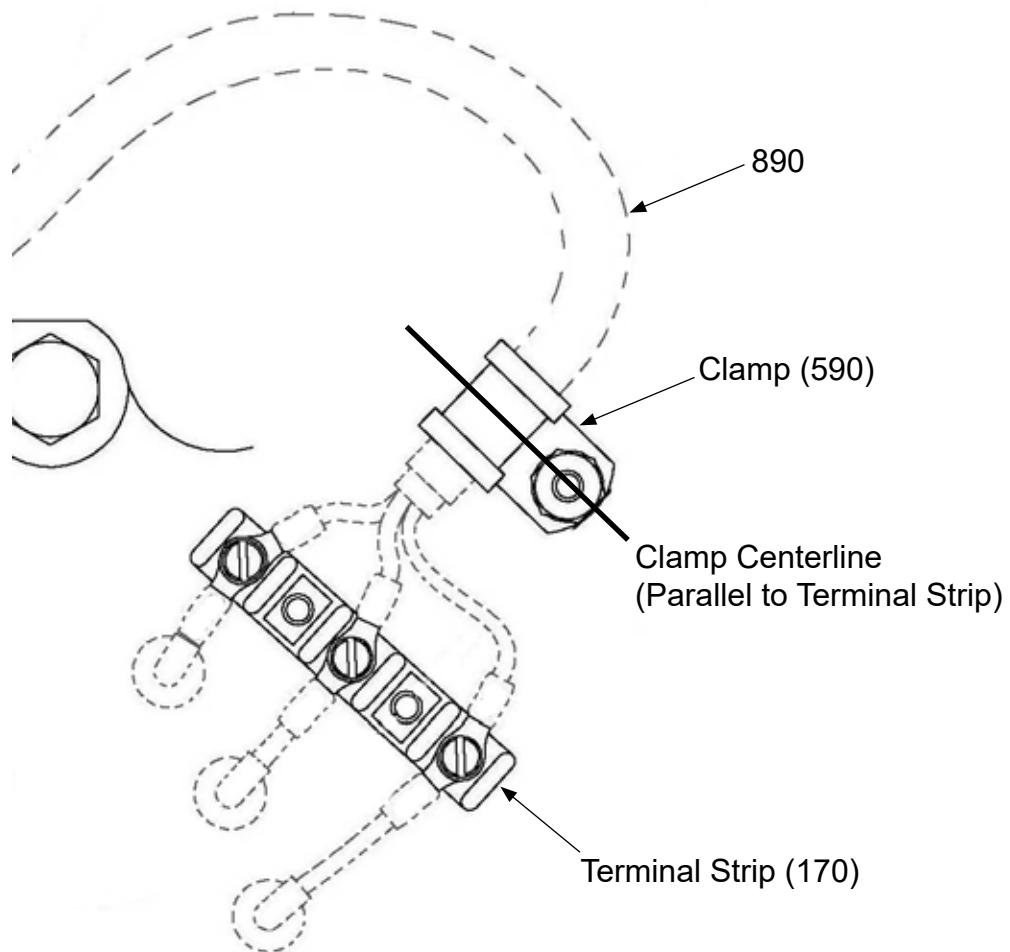


**Terminal Strip and Loop Clamp to Bulkhead Attachment  
Figure DF-6**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-5E2767-1, 7931-67-835-1, and 7931-67-933-1**



**NOTE:** This figure illustrates the orientation of the clamp to the terminal strip. Wire harness/slip ring wires are shown for reference only. Actual wire harness may have two or three wires.

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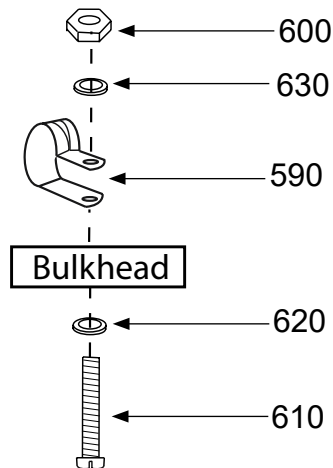
**Loop Clamp Orientation  
Figure DF-7**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

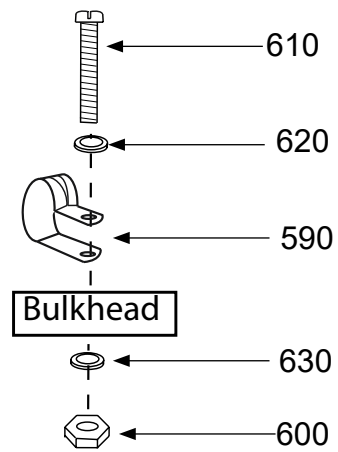
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-5E2767-1, 7931-67-835-1, and 7931-67-933-1**

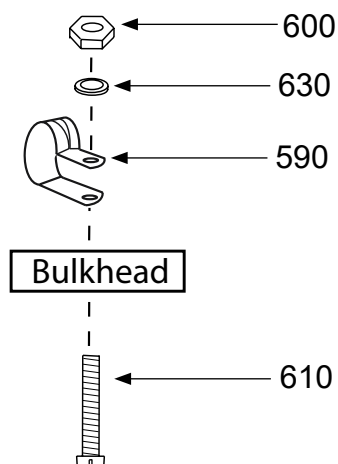
**Configuration A**



**Configuration B**



**Configuration C**



**Loop Clamp to Bulkhead Hardware  
Figure DF-8**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-5E2767-1, 7931-67-835-1, and 7931-67-933-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-5E2767-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) SUPERSEDED BY 106298, POST HC-SB-30-366 INSTALLATION INSTRUCTION 11DF FIGURES: DF-1 thru DF-8</b>		
170	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY ITEM 170A	4	
170A	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES ITEM 170	4	
190	7931-2E1365	• TAPPED EYELET SUPERSEDED BY ITEM 190A	8	Y
190A	2H1365	• TAPPED EYELET SUPERSEDES ITEM 190	8	Y
200	B-3854-41	• WASHER, LOCK, INTERNAL TOOTH	16	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	8	Y
590	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	4	Y
600	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
610	B-6976-10	• SCREW, WASHER, HEAD	4	Y
620	B-3854-42	• WASHER, LOCK	4	Y
630	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
890	7931-3E2092-4	• WIRE HARNESS SUPERSEDED BY ITEM 890A	4	Y
890A	3H2092-4	• WIRE HARNESS SUPERSEDES ITEM 890	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	8	Y
1140	7931-4E2674-2	• SLIP RING ASSEMBLY SUPERSEDED BY ITEM 1140A	1	
1140A	4H2674-2	• SLIP RING ASSEMBLY SUPERSEDES ITEM 1140	1	
1170	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	8	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 7931-5E2767-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-5E2767-1, 7931-67-835-1, and 7931-67-933-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-835-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) SUPERSEDED BY 106299, POST HC-SB-30-366 INSTALLATION INSTRUCTION 11DF FIGURES: DF-1 thru DF-8</b>		
170	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY ITEM 170A	4	
170A	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES ITEM 170	4	
180	B-6655-06	• NUT, HEX, SELF-LOCKING	8	Y
200	B-3854-41	• WASHER, LOCK	8	Y
210	B-3837-N616	• WASHER, CORROSION RESISTANT	8	Y
220	B-6631-232	• SCREW, 6-32, FILLISTER HEAD, CRES	8	Y
590	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	4	Y
600	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
610	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
620	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
630	B-3855-31	• WASHER, LOCK, EXTERNAL TOOTH	4	Y
890	7931-3E2383-4	• DE-ICE WIRE HARNESS SUPERSEDED BY ITEM 890A	4	Y
890A	3H2383-4	• DE-ICE WIRE HARNESS SUPERSEDES ITEM 890	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	8	Y
1140	7931-4E2674-1	• SLIP RING ASSEMBLY SUPERSEDED BY ITEM 1140A	1	
1140A	4H2674-1	• SLIP RING ASSEMBLY SUPERSEDES ITEM 1140	1	
1170	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	8	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 7931-67-835-1**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-5E2767-1, 7931-67-835-1, and 7931-67-933-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-933-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) SUPERSEDED BY 106298, POST HC-SB-30-366 INSTALLATION INSTRUCTION 11DF FIGURES: DF-1 thru DF-8</b>		
170	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES ITEM 170A	4	
170A	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY ITEM 170	4	
190	2H1365	• TAPPED EYELET SUPERSEDES ITEM 190A	8	Y
190A	7931-2E1365	• TAPPED EYELET SUPERSEDED BY ITEM 190	8	Y
220	B-3854-41	• WASHER, LOCK	8	Y
210	B-3854-41	• WASHER, LOCK	8	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	8	Y
590	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	4	Y
600	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
610	B-3856-248	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
620	B-3854-42	• WASHER, LOCK	4	Y
630	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
890	3H2092-4	• WIRE HARNESS SUPERSEDES ITEM 890A	4	Y
890A	7931-3E2092-4	• WIRE HARNESS SUPERSEDED BY ITEM 890	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	8	Y
1140	4H2674-2	• SLIP RING ASSEMBLY SUPERSEDES ITEM 1140A	1	
1140A	7931-4E2674-2	• SLIP RING ASSEMBLY SUPERSEDED BY ITEM 1140	1	
1170	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	8	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 7931-67-933-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-5E2767-1, 7931-67-835-1, and 7931-67-933-1**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-5E2797-1, 7931-67-450-1, 7931-67-815-1,  
7931-67-931-1, and 7931-67-942-1**

**DG. Installation Instruction 11DG**

- (1) Using the screws (1170), attach the slip ring (1140) and the bulkhead to the hub as shown in Figure DG-1.
  - (a) Torque each screw (1170) 96-120 In-Lbs (10.1-13.5 N•m).
  - (b) Perform slip ring run-out check in accordance with the Check chapter in this manual.
- (2) Position the propeller blades at reverse blade angle.
- (3) Assemble the plug connection between the wire harness (890) and the de-ice boot.
- (4) Install the tie strap (930) around the wire harness/de-ice boot plug connection.
- (5) Position the tie strap head (930) in approximate location shown in Figure DG-2.
- (6) Route the terminal end of the wire harness (890) through the hole in counterweight rib, as shown in Figure DG-2.
- (7) Secure the wire harness/boot connection to the counterweight.
  - (a) Install tie straps (910) under the tie strap (930) connecting the wire harness/boot plugs, and around the counterweight as shown in Figure DG-2.
  - (b) Position the tie strap head in the approximate location on the side of the counterweight as shown in Figure DG-2. Do not tighten the tie strap (910) at this time.
- (8) Verify that the wire harness (890) is taut through the counterweight hole.
- (9) Secure the wire harness (890) to the counterweight by installing the tie strap (930) through the counterweight hole and around the wire harness (890) on both sides of the counterweight. Position the tie strap head in the approximate location shown in Figure DG-2.
- (10) Tighten all of the tie straps (910 and 930).
- (11) If applicable, bond the de-ice boot lead wires to the blade in accordance with the De-ice Boot Removal/Installation chapter in this manual.

**NOTE:** Some de-ice boots are designed with a bent lead strap. Install the de-ice boot in accordance with the De-ice Boot Removal/Installation chapter in this manual.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-5E2797-1, 7931-67-450-1, 7931-67-815-1,  
7931-67-931-1, and 7931-67-942-1**

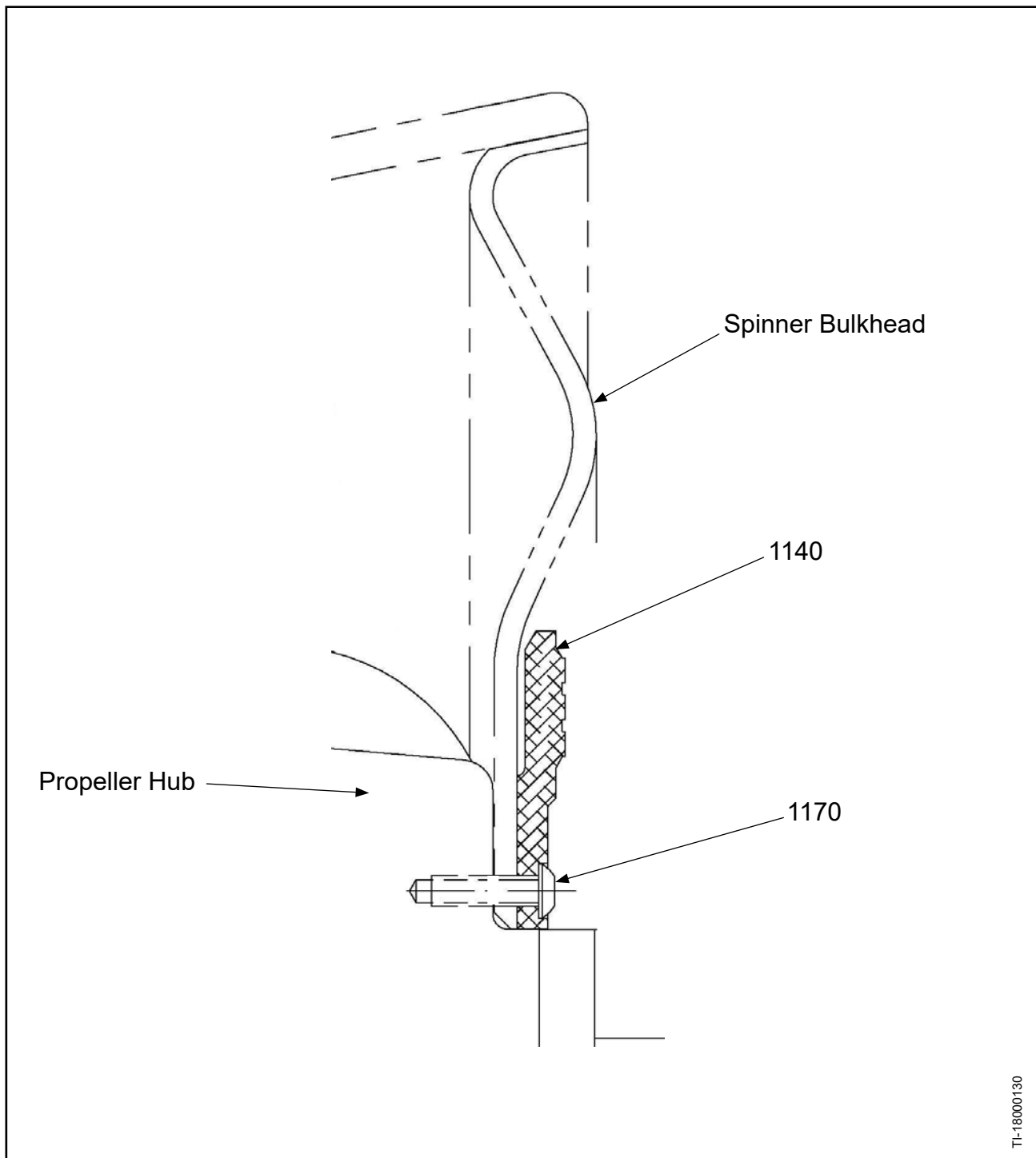
DG. Installation Instruction 11DG - continued

- (12) Position the terminal strip (170) on the bulkhead in accordance with Orientation B in Figure DG-3.
- (13) Using the screw (220), washers (200 and/or 210) nut (190), attach the terminal strip (170) to the bulkhead in accordance with Figure DG-4, and the configuration specified below:
  - (a) 7931-5E2797-1: Configuration C
  - (b) 7931-67-450-1: Configuration C
  - (c) 7931-67-815-1: Configuration B
  - (d) 7931-67-931-1: Configuration A
  - (e) 7931-67-942-1: Configuration C
- (14) Torque the screw (220) to 10-12 In-Lbs (1.1-1.3 N•m).
- (15) Install the slip ring lead wires and de-ice wire harness (890) to the terminal strip (170) in accordance with Figure DG-5.
- (16) Tighten the terminal screws until snug.
- (17) Install the clamp (590), around the wire harness (890).
- (18) Position the centerline of the clamp (590) parallel to terminal strip (170) in accordance with Figure DG-7.
- (19) Using the screw (610), washers (620 and/or 630) nut (600), attach the clamp (590) to the bulkhead in accordance with Figure DG-6 and the configuration specified below:
  - (a) 7931-5E2797-1: Configuration A
  - (b) 7931-67-450-1: Configuration C
  - (c) 7931-67-815-1: Configuration B
  - (d) 7931-67-931-1: Configuration A
  - (e) 7931-67-942-1: Configuration A
- (20) Torque the screw (610) to 22-25 In-Lbs (2.48-2.82 N•m).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-5E2797-1, 7931-67-450-1, 7931-67-815-1,  
7931-67-931-1, and 7931-67-942-1**



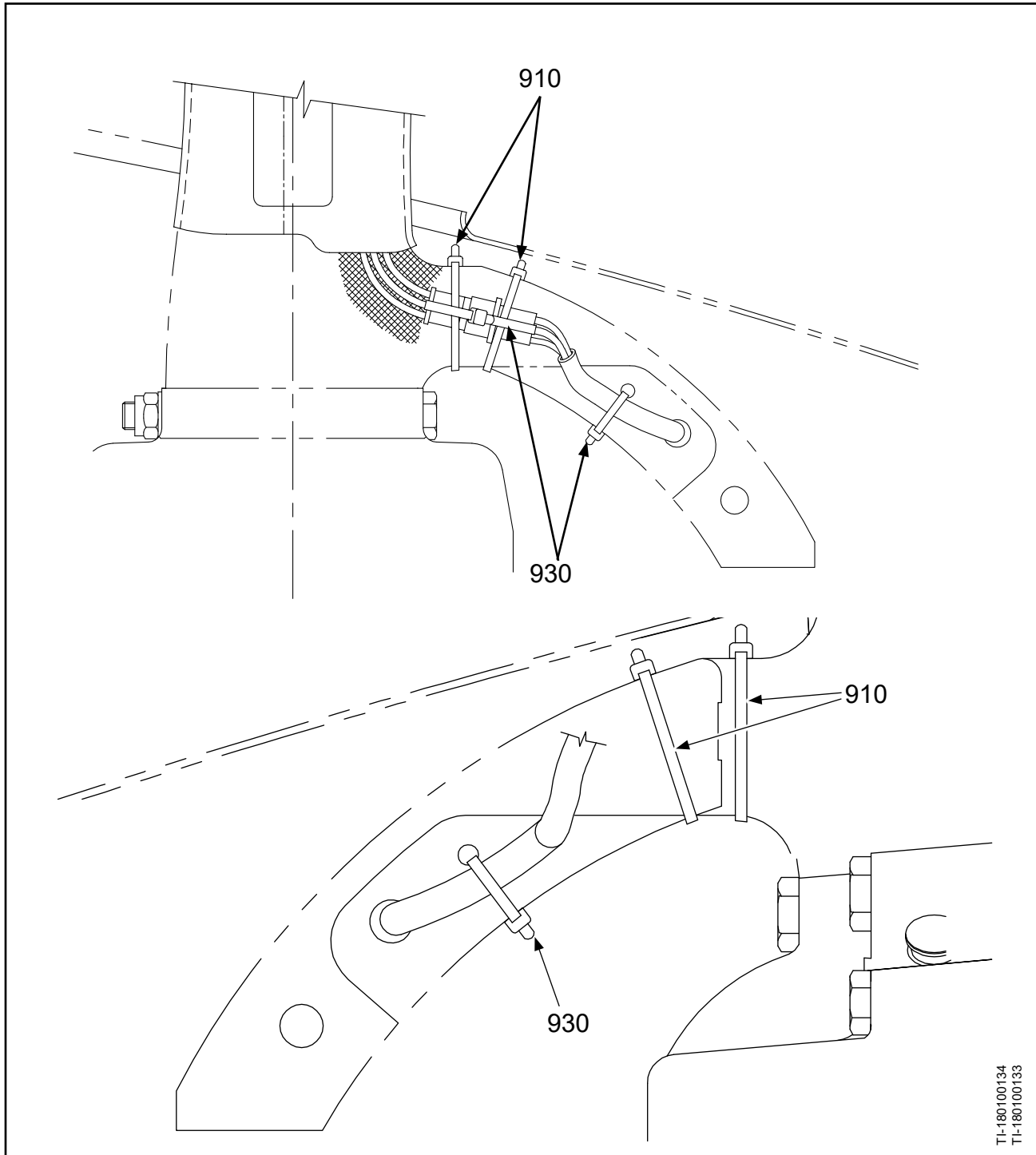
**Slip Ring Mounting  
Figure DG-1**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-5E2797-1, 7931-67-450-1, 7931-67-815-1,  
7931-67-931-1, and 7931-67-942-1**

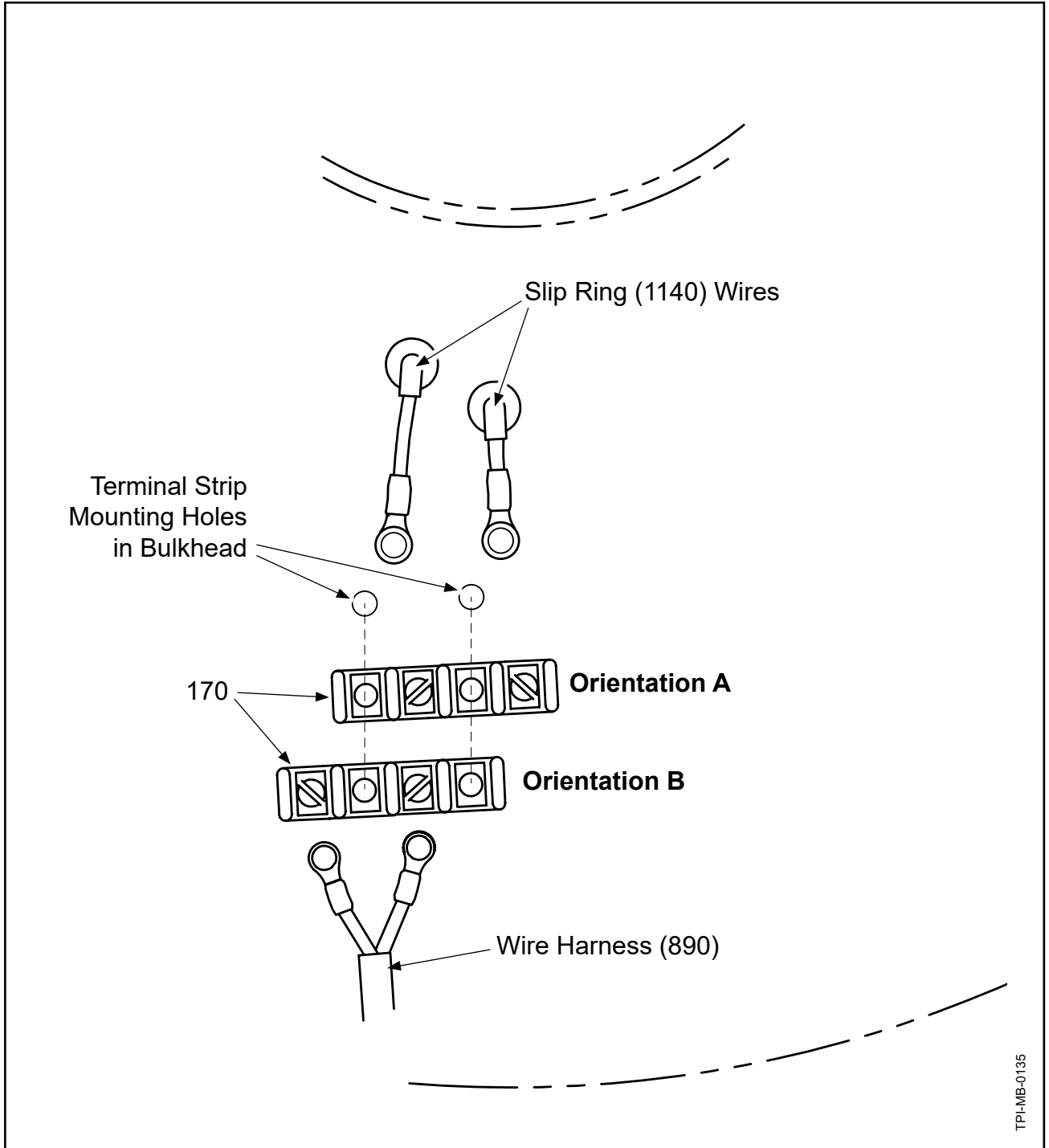


**Wire Harness to Counterweight  
Figure DG-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-5E2797-1, 7931-67-450-1, 7931-67-815-1,  
7931-67-931-1, and 7931-67-942-1**

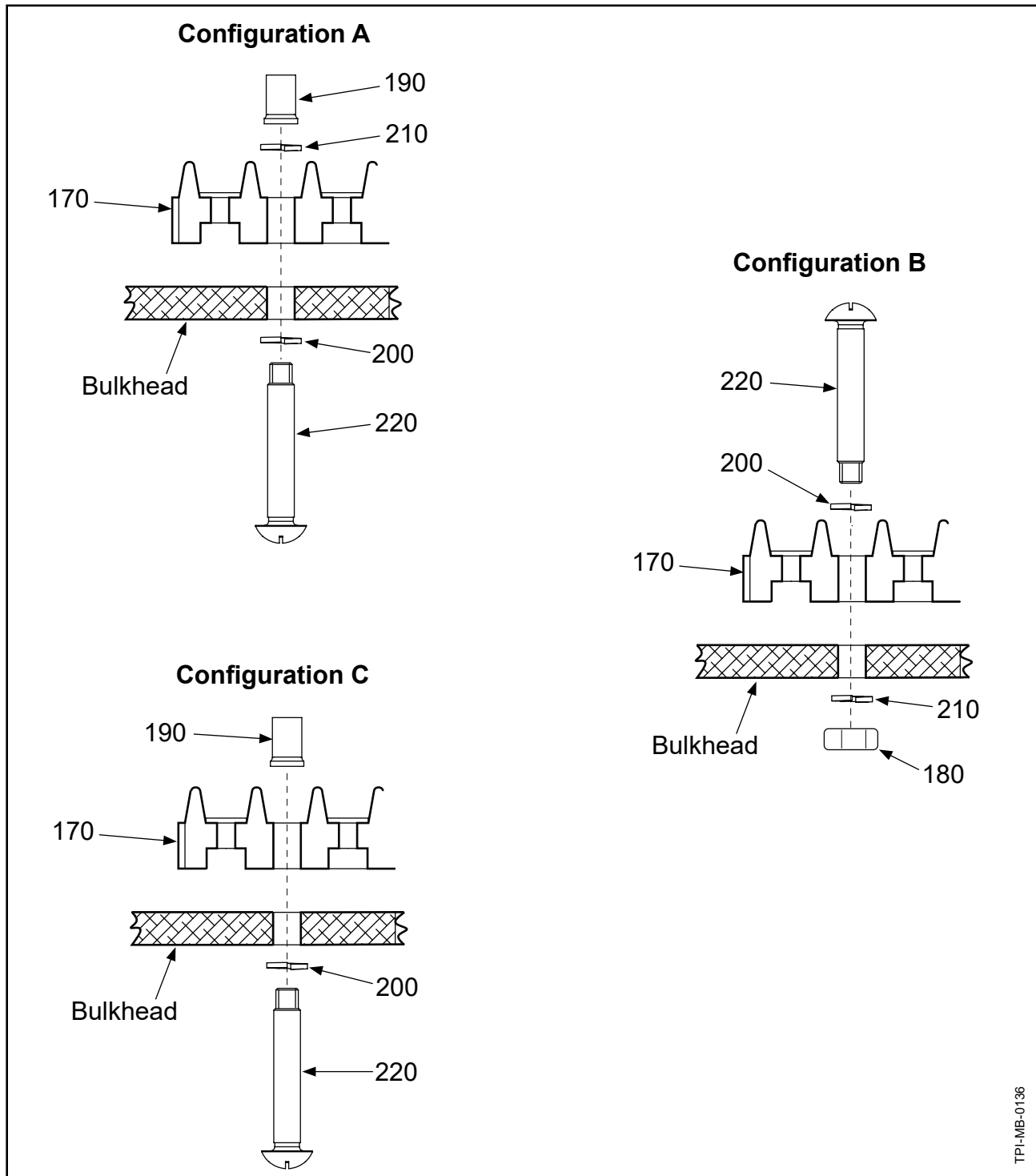


**Two-wire Terminal Strip Orientation  
Figure DG-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-5E2797-1, 7931-67-450-1, 7931-67-815-1,  
7931-67-931-1, and 7931-67-942-1**



**Terminal Strip Hardware Configurations: Bulkhead Mounted  
Figure DG-4**

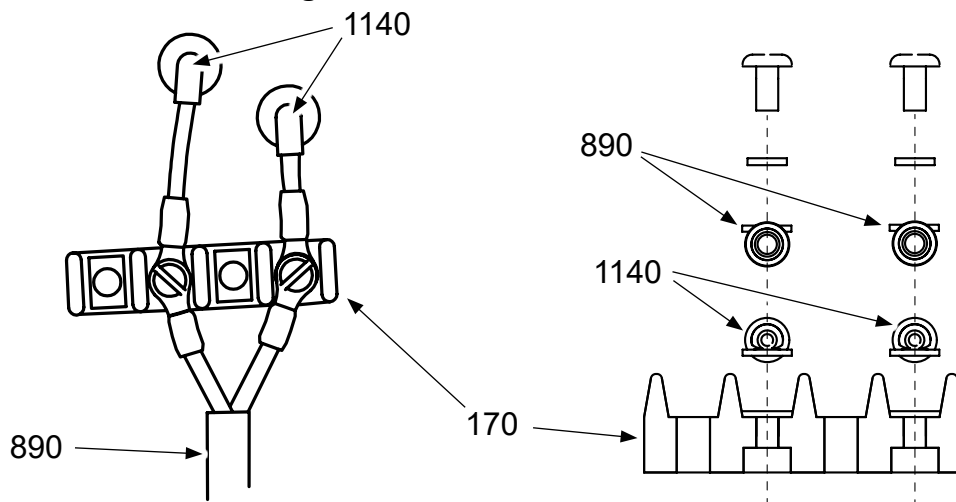


**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-5E2797-1, 7931-67-450-1, 7931-67-815-1,  
7931-67-931-1, and 7931-67-942-1**

**Typical Two-wire Configuration**



**NOTE:** The illustration shows slip ring wires on a  
typical right-hand (rotation) propeller.

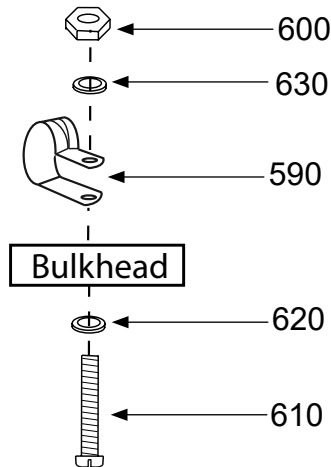
**Terminal Strip Lead Wire Configurations: Bulkhead Mounted  
Figure DG-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

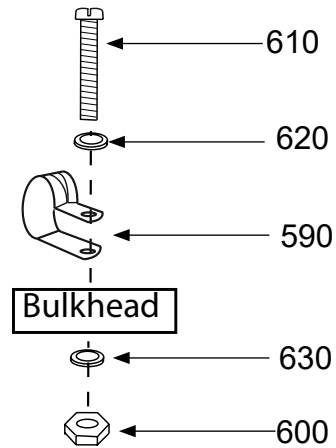
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-5E2797-1, 7931-67-450-1, 7931-67-815-1,  
7931-67-931-1, and 7931-67-942-1**

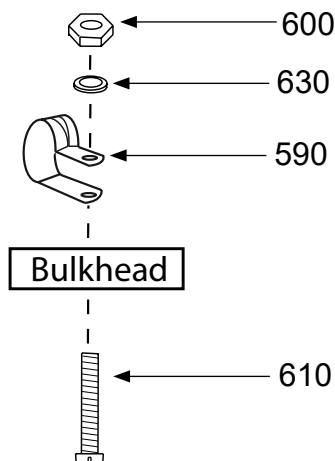
**Configuration A**



**Configuration B**



**Configuration C**



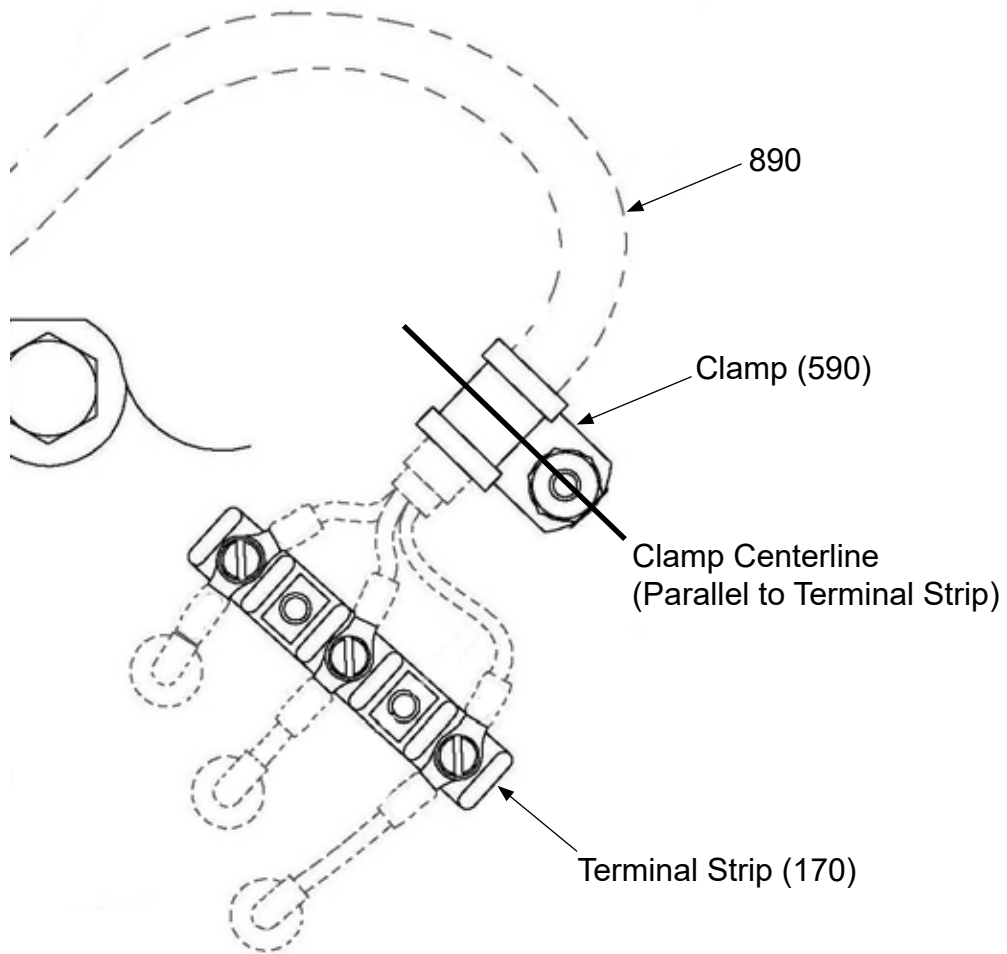
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TI-00180BC  
TI-00180CC

**Loop Clamp Hardware Configurations: Bulkhead Mounted  
Figure DG-6**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-5E2797-1, 7931-67-450-1, 7931-67-815-1,  
7931-67-931-1, and 7931-67-942-1**



**NOTE:** This figure illustrates the orientation of the clamp to the terminal strip.  
Wire harness/slip ring wires are shown for reference only.  
Actual wire harness may have two or three wires.

TPI-MB-0310

**Loop Clamp Orientation  
Figure DG-7**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-5E2797-1, 7931-67-450-1, 7931-67-815-1,  
7931-67-931-1, and 7931-67-942-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-5E2797-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) SUPERSEDED BY 106298, POST HC-SB-30-366 INSTALLATION INSTRUCTION 11DG FIGURES: DG-1 thru DG-7</b>		
170	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY ITEM 170A	4	
170A	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES ITEM 170	4	
190	7931-2E1365	• TAPPED EYELET SUPERSEDED BY ITEM 190A	8	Y
190A	2H1365	• TAPPED EYELET SUPERSEDES ITEM 190	8	Y
200	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	8	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	8	Y
590	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	4	Y
600	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
610	B-6976-10	• SCREW, WASHER, HEAD	4	Y
620	B-3854-42	• WASHER, LOCK	4	Y
630	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
890	7931-3E2092-4	• WIRE HARNESS SUPERSEDED BY ITEM 890A	4	Y
890A	3H2092-4	• WIRE HARNESS SUPERSEDES ITEM 890	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	8	Y
1140	7931-4E2674-2	• SLIP RING ASSEMBLY SUPERSEDED BY ITEM 1140A	1	
1140A	4H2674-2	• SLIP RING ASSEMBLY SUPERSEDES ITEM 1140	1	
1170	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	8	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 7931-5E2797-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-5E2797-1, 7931-67-450-1, 7931-67-815-1,  
7931-67-931-1, and 7931-67-942-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-450-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) SUPERSEDED BY 106298, POST HC-SB-30-366 INSTALLATION INSTRUCTION 11DG FIGURES: DG-1 thru DG-7</b>		
170	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY ITEM 170A	4	
170A	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES ITEM 170	4	
190	7931-2E1365	• TAPPED EYELET SUPERSEDED BY ITEM 190A	8	Y
190A	2H1365	• TAPPED EYELET SUPERSEDES ITEM 190	8	Y
200	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	8	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	8	Y
590	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	4	Y
600	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
610	B-6976-10	• SCREW, 8-32, WASHER HEAD	4	Y
630	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
890	7931-3E2092-4	• WIRE HARNESS SUPERSEDED BY ITEM 890A	4	Y
890A	3H2092-4	• WIRE HARNESS SUPERSEDES ITEM 890	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	8	Y
1140	7931-4E2674-2	• SLIP RING ASSEMBLY SUPERSEDED BY ITEM 1140A	1	
1140A	4H2674-2	• SLIP RING ASSEMBLY SUPERSEDES ITEM 1140	1	
1170	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	8	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 7931-67-450-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-5E2797-1, 7931-67-450-1, 7931-67-815-1,  
7931-67-931-1, and 7931-67-942-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-815-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) SUPERSEDED BY 106299, POST HC-SB-30-366 INSTALLATION INSTRUCTION 11DG FIGURES: DG-1 thru DG-7</b>		
170	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY ITEM 170A	4	
170A	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES ITEM 170	4	
180	B-6655-06	• NUT, HEX, SELF-LOCKING	8	Y
200	B-3854-41	• WASHER, LOCK	8	Y
210	B-3837-N616	• WASHER, CORROSION RESISTANT	8	Y
220	B-6631-232	• SCREW, 6-32, FILLISTER HEAD, CRES	8	Y
590	B-6735	• CLAMP, LOOP, CUSHIONED	4	Y
600	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
610	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
620	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
630	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
890	7931-3E2092-4	• WIRE HARNESS SUPERSEDED BY ITEM 890A	4	Y
890A	3H2092-4	• WIRE HARNESS SUPERSEDES ITEM 890	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	8	Y
1140	7931-4E2674-1	• SLIP RING ASSEMBLY SUPERSEDED BY ITEM 1140A		1
1140A	4H2674-1	• SLIP RING ASSEMBLY SUPERSEDES ITEM 1140	1	
1170	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	8	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 7931-67-815-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-5E2797-1, 7931-67-450-1, 7931-67-815-1,  
7931-67-931-1, and 7931-67-942-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-931-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) SUPERSEDED BY 106298, POST HC-SB-30-366 INSTALLATION INSTRUCTION 11DG FIGURES: DG-1 thru DG-7</b>		
170	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY ITEM 170A	4	
170A	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES ITEM 170	4	
190	7931-2E1365	• TAPPED EYELET SUPERSEDED BY ITEM 190A	8	Y
190A	2H1365	• TAPPED EYELET SUPERSEDES ITEM 190	8	Y
200	B-3854-41	• WASHER, LOCK	8	Y
210	B-3854-41	• WASHER, LOCK	8	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	8	Y
590	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	4	Y
600	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
610	B-3856-248	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
620	B-3854-42	• WASHER, LOCK	4	Y
630	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
890	7931-3E2092-4	• WIRE HARNESS SUPERSEDED BY ITEM 890A	4	Y
890A	3H2092-4	• WIRE HARNESS SUPERSEDES ITEM 890	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	8	Y
1140	7931-4E2674-2	• SLIP RING ASSEMBLY SUPERSEDED BY ITEM 1140A	1	
1140A	4H2674-2	• SLIP RING ASSEMBLY SUPERSEDES ITEM 1140	1	
1170	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	8	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 7931-67-931-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-5E2797-1, 7931-67-450-1, 7931-67-815-1,  
7931-67-931-1, and 7931-67-942-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-942-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) SUPERSEDED BY 106298, POST HC-SB-30-366 INSTALLATION INSTRUCTION 11DG FIGURES: DG-1 thru DG-7</b>		
170	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY ITEM 170A	4	
170A	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES ITEM 170	4	
190	7931-2E1365	• TAPPED EYELET SUPERSEDED BY ITEM 190A	8	Y
190A	2H1365	• TAPPED EYELET SUPERSEDES ITEM 190	8	Y
200	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	8	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	8	Y
590	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	4	Y
600	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
610	B-6976-10	• SCREW, 8-32, WASHER HEAD	4	Y
620	B-3854-42	• WASHER, LOCK	4	Y
630	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
890	7931-3E2092-4	• WIRE HARNESS SUPERSEDED BY ITEM 890A	4	Y
890A	3H2092-4	• WIRE HARNESS SUPERSEDES ITEM 890	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	8	Y
1140	7931-4E2674-2	• SLIP RING ASSEMBLY SUPERSEDED BY ITEM 1140A	1	
1140A	4H2674-2	• SLIP RING ASSEMBLY SUPERSEDES ITEM 1140	1	
1170	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	8	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 7931-67-942-1**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103553 and 104779**

**DH. Installation Instruction 11DH**

- (1) Using the screws (1170), attach the slip ring (1140) and the bulkhead to the hub as shown in Figure DH-1.
  - (a) Torque each screw (1170) 96-120 In-Lbs (10.1-13.5 N•m).
  - (b) Perform slip ring run-out check in accordance with the Check chapter in this manual.
- (2) Position the propeller blades at reverse blade angle.
- (3) Assemble the plug connection between the wire harness (890) and the de-ice boot.
- (4) Install the tie strap (930) around the wire harness/de-ice boot plug connection.
- (5) Position the tie strap head (930) in approximate location shown in Figure DH-2.
- (6) Route the terminal end of the wire harness (890) through the hole in counterweight rib, as shown in Figure DH-2.
- (7) Secure the wire harness/boot connection to the counterweight.
  - (a) Install tie straps (910) under the tie strap (930) connecting the wire harness/boot plugs, and around the counterweight as shown in Figure DH-2.
  - (b) Position the tie strap head in the approximate location on the side of the counterweight as shown in Figure DH-2. Snug but do not tighten the tie straps (910) at this time.
- (8) Verify that the wire harness (890) is taut through the counterweight hole.
- (9) Secure the wire harness (890) to the counterweight by installing the tie strap (930) through the counterweight hole and around the wire harness (890) on both sides of the counterweight. Position the tie strap head in the approximate location shown in Figure DH-2.
- (10) Tighten all of the tie straps (910 and 930).
- (11) Position the terminal strip (170) on the bulkhead in accordance with Orientation B in Figure DH-3.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

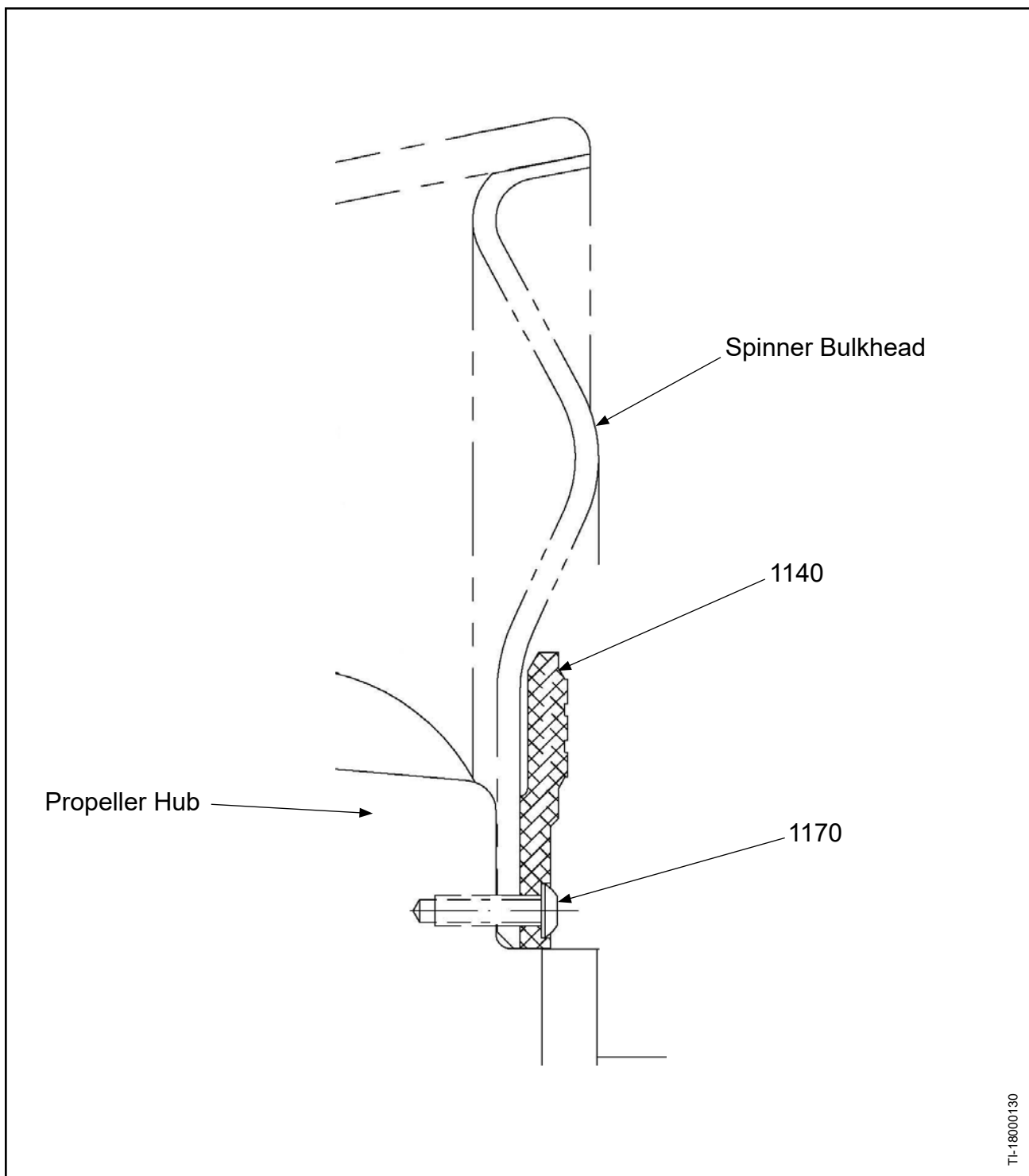
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103553 and 104779**

**DH. Installation Instruction 11DH - continued**

- (12) Using the screw (220), washers (200 and/or 210), and nut (190), attach the terminal strip (170) to the bulkhead in accordance with Figure DH-4.
- (13) Torque the screw (220) to 10-12 In-Lbs (1.1-1.3 N•m).
- (14) Install the slip ring lead wires and de-ice wire harness (890) to the terminal strip (170) in accordance with Figure DH-5.
- (15) Tighten the terminal screws until snug.
- (16) Install the clamp (590), around the wire harness (890) in accordance with Figure DH-6 and Figure DH-7.
- (17) Position the centerline of the clamp (590) parallel to terminal strip (170) in accordance with Figure DH-7.
- (18) Using the screw (610), washers (620 and/or 630), and nut (600), attach the clamp (590) to the bulkhead in accordance with Figure DH-8 and the configuration specified below:
  - (a) 103553: Configuration A
  - (b) 104779: Configuration B
- (19) Torque the screw (610) to 22-25 In-Lbs (2.48-2.82 N•m).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

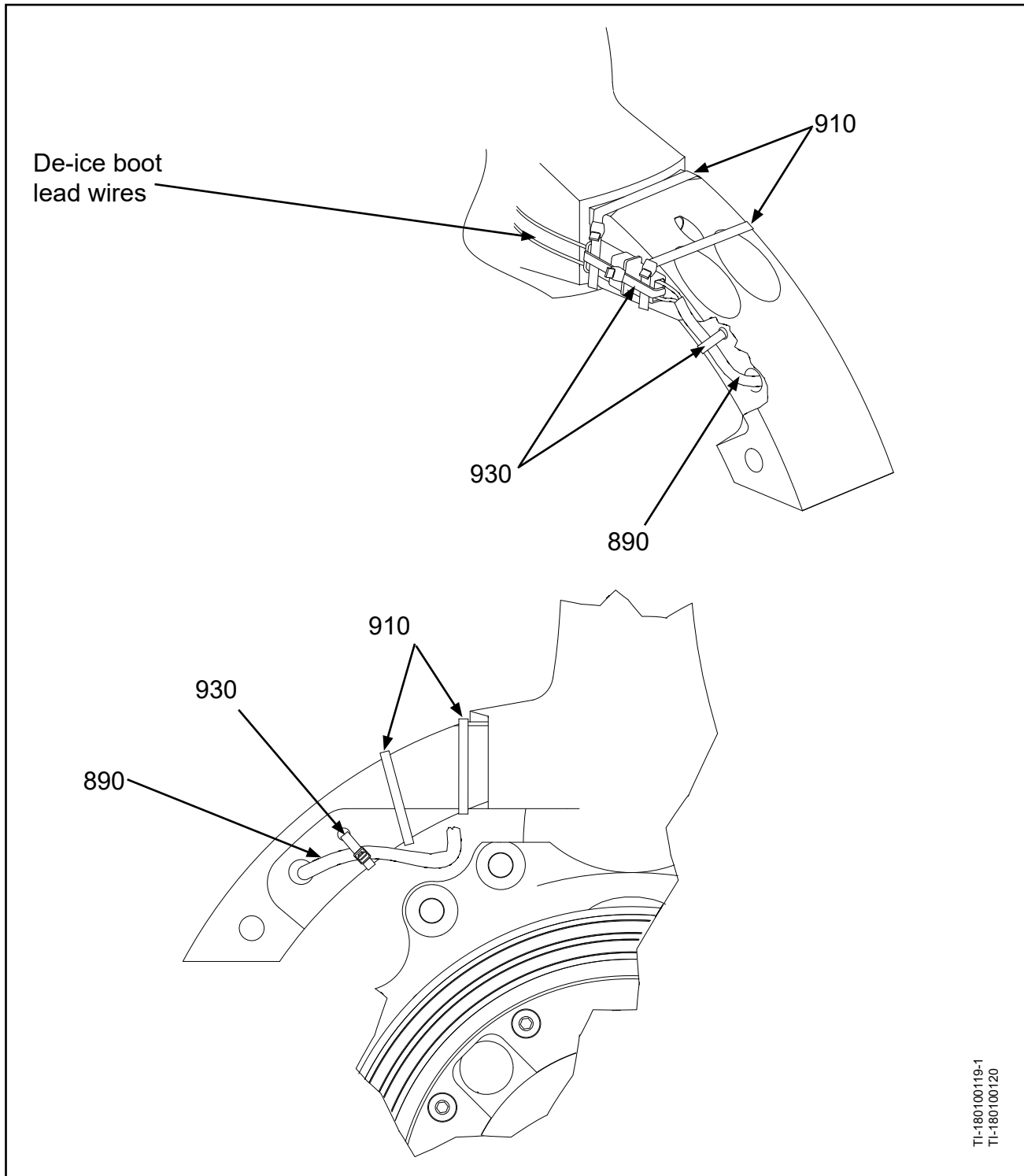
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103553 and 104779**



**Slip Ring Mounting  
Figure DH-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103553 and 104779**

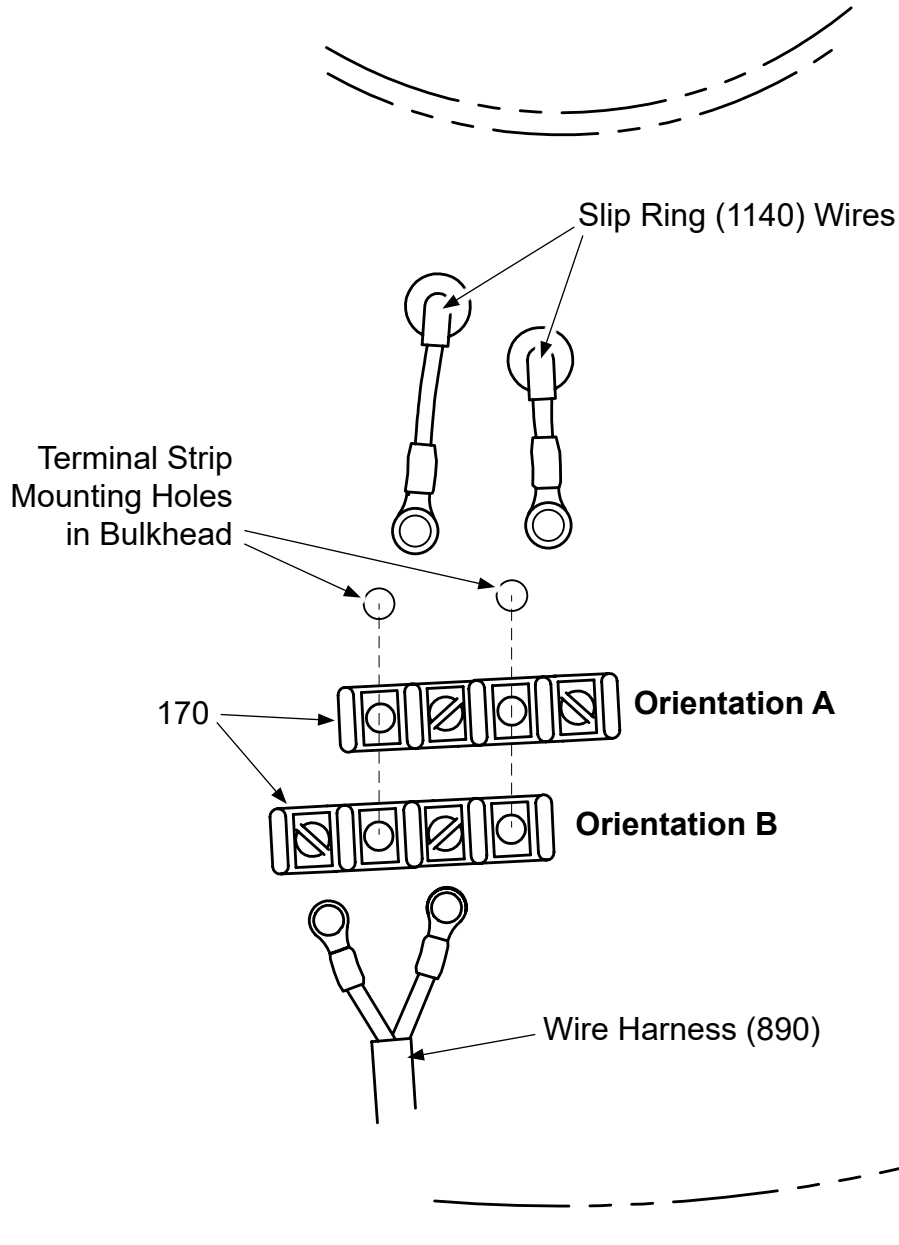


**Wire Harness to Counterweight  
Figure DH-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103553 and 104779**

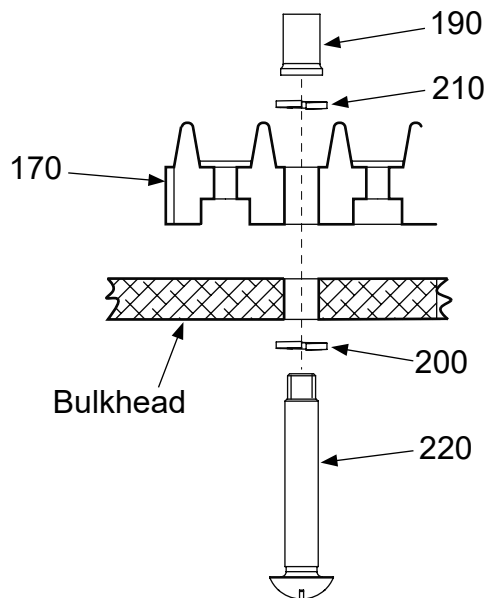
**Two-wire Terminal Strip Orientation**



**Terminal Strip Hardware Configurations: Bulkhead Mounted  
Figure DH-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103553 and 104779**



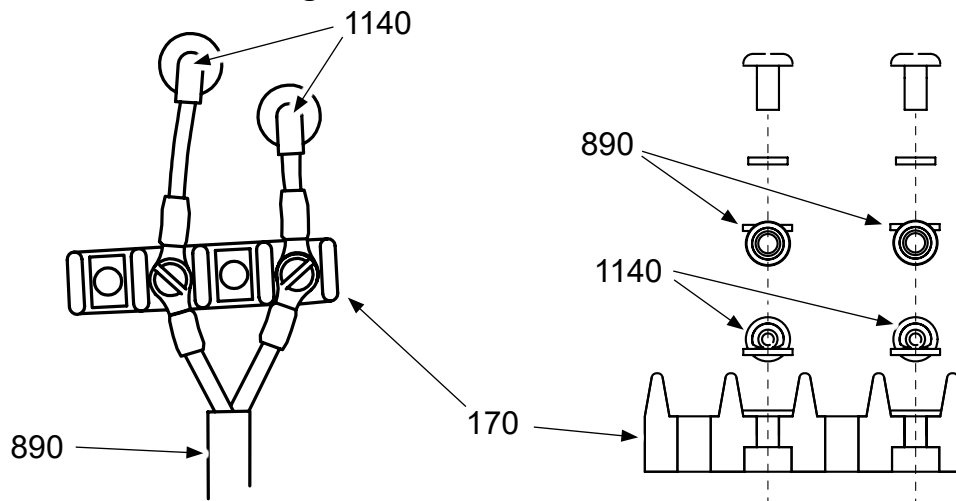
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**Terminal Strip Hardware Configuration: Bulkhead Mounted  
Figure DH-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103553 and 104779**

**Typical Two-wire Configuration**

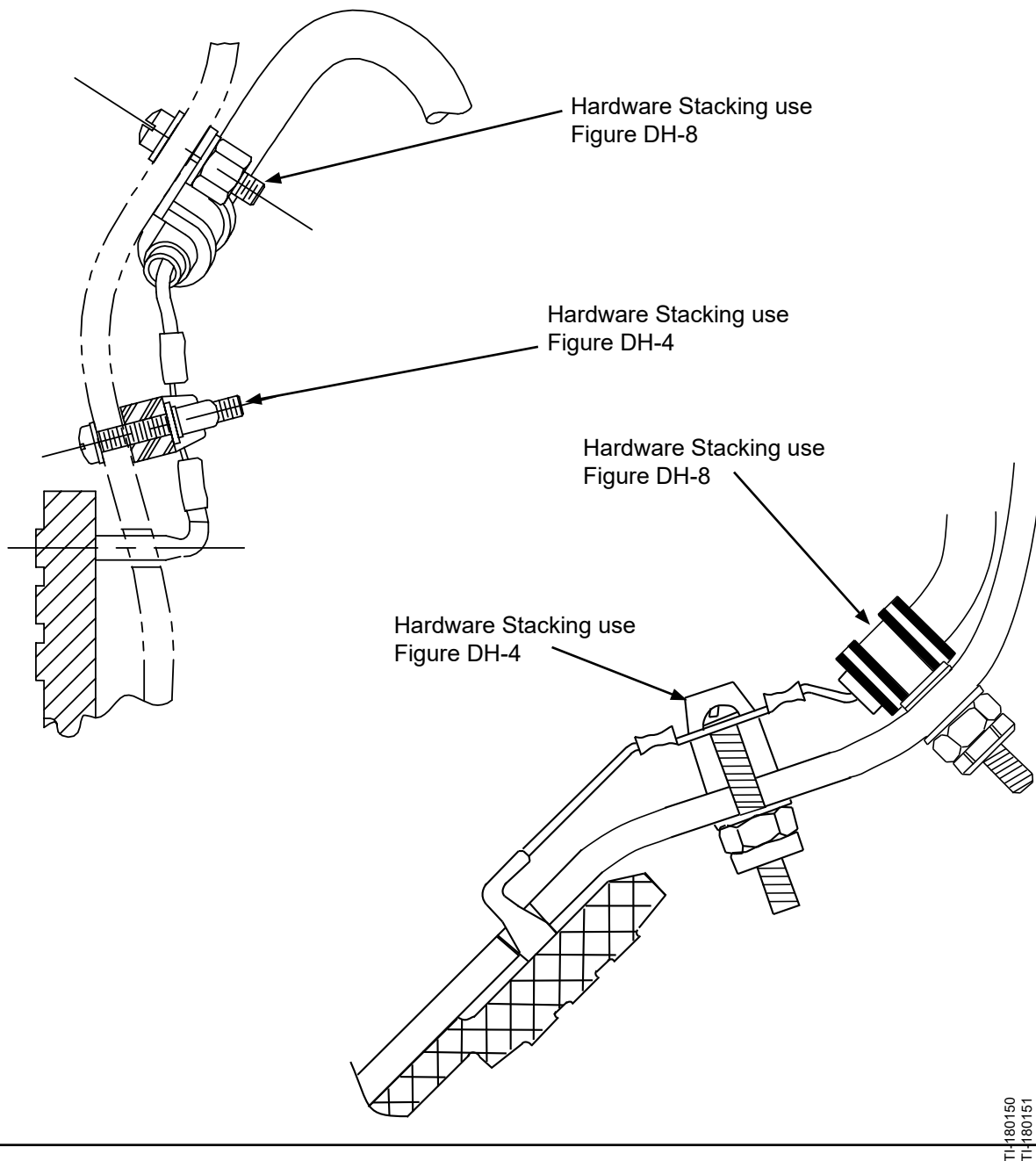


**NOTE:** The illustrations show slip ring wires on a  
typical right-hand (rotation) propeller.

**Terminal Strip Lead Wire Configurations: Bulkhead Mounted  
Figure DH-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103553 and 104779**



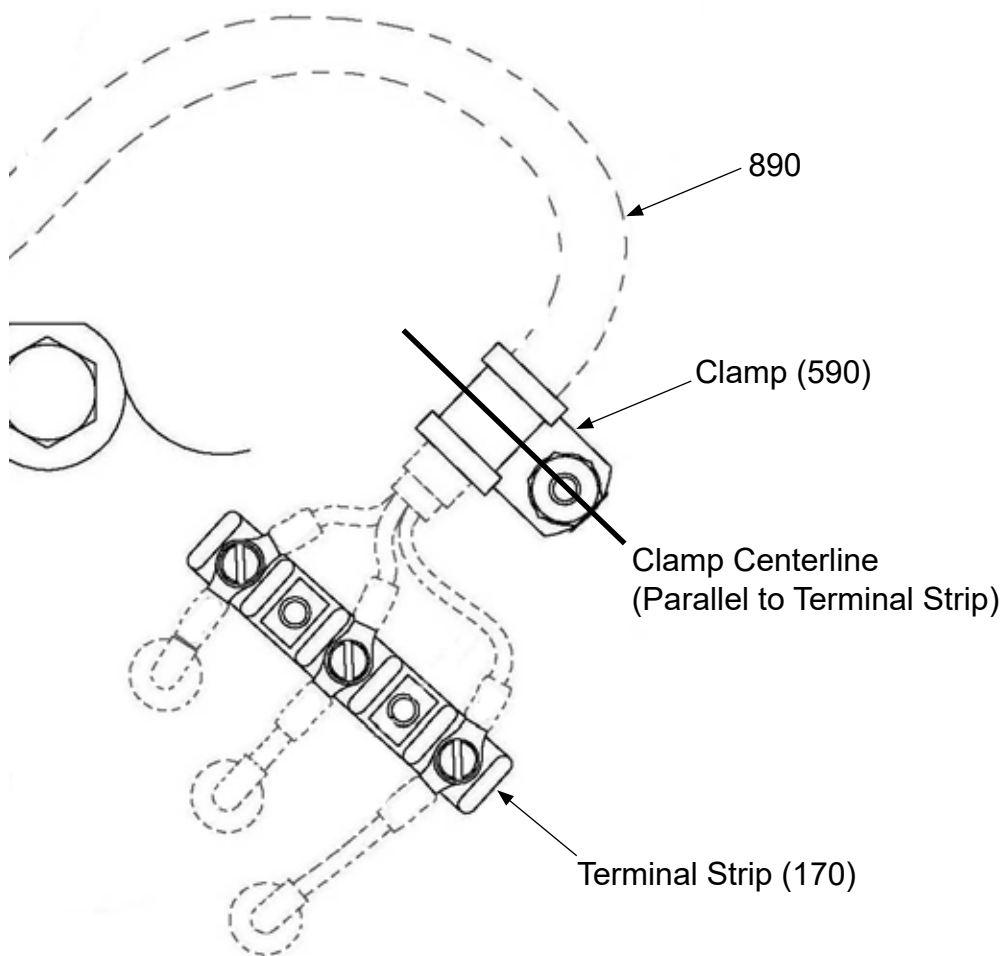
**Terminal Strip and Loop Clamp to Bulkhead Attachment  
Figure DH-6**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**103553 and 104779**



**NOTE:** This figure illustrates the orientation of the clamp to the terminal strip. Wire harness/slip ring wires are shown for reference only. Actual wire harness may have two or three wires.

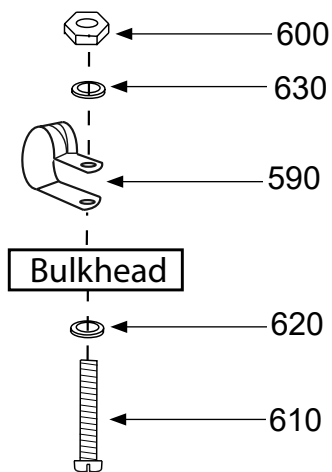
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**Loop Clamp Orientation  
Figure DH-7**

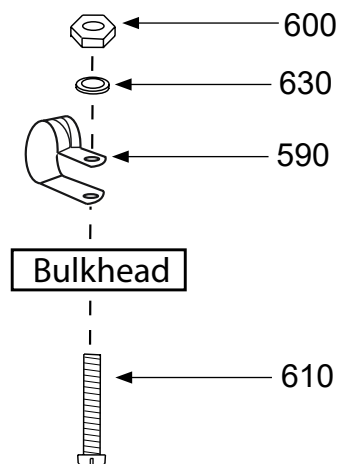
**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103553 and 104779**

**Configuration A**



**Configuration B**



TI-00180AC  
TI-00180BC  
TI-00180CC

**Loop Clamp to Bulkhead Hardware Configurations  
Figure DH-8**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103553 and 104779**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>103553</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>SUPERSEDED BY 106298, POST HC-SB-30-366</b> <b>INSTALLATION INSTRUCTION 11DH</b> <b>FIGURES: DH-1 thru DH-8</b>		
170	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM	4	
190	2H1365	• TAPPED EYELET	8	Y
200	B-3854-41	• WASHER, LOCK	8	Y
210	B-3854-41	• WASHER, LOCK	8	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	8	Y
590	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	4	Y
600	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
610	B-3856-248	• SCREW, 8-32, WASHER HEAD	4	Y
620	B-3854-42	• WASHER, LOCK	4	Y
630	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
890	3H2092-4	• WIRE HARNESS	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	8	Y
1140	4H2674-2	• SLIP RING ASSEMBLY	1	
1170	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	8	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 103553**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103553 and 104779**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>104779</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>SUPERSEDED BY 106298, POST HC-SB-30-366</b> <b>INSTALLATION INSTRUCTION 11DH</b> <b>FIGURES: DH-1 thru DH-8</b>		
170	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM	4	
190	2H1365	• TAPPED EYELET	8	Y
200	B-3854-41	• WASHER, LOCK	8	Y
210	B-3854-41	• WASHER, LOCK	8	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	8	Y
590	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	4	Y
600	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
610	B-3856-248	• SCREW, 8-32, WASHER HEAD	4	Y
630	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
890	3H2092-4	• WIRE HARNESS	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	8	Y
1140	4H2674-2	• SLIP RING ASSEMBLY	1	
1170	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	8	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 104779**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-480-3**

**DI.    Installation Instruction 11DI**

- (1) Using the bolts (1205) and washers (1210), attach the slip ring (1140), aircraft manufacturer's pulley set, and bulkhead to the hub as shown in Figure DI-1.
  - (a) Apply anti-zeize compound CM118, then torque each bolt (1205) to 36-44 In-Lbs (4.1-4.9 N•m).
  - (b) Perform slip ring run-out check in accordance with the Check chapter in this manual.
- (2) Position the propeller blades at reverse blade angle.
- (3) Assemble the plug connection between the wire harness (890) and the de-ice boot.
- (4) Install the tie strap (930) around the wire harness/de-ice boot plug connection.
- (5) Position the tie strap head (930) in approximate location shown in Figure DI-2.
- (6) Route the terminal end of the wire harness (890) through the hole in counterweight rib, as shown in Figure DI-2.
- (7) Secure the wire harness/boot connection to the counterweight.
  - (a) Install tie straps (910) under the tie strap (930) connecting the wire harness/boot plugs, and around the counterweight as shown in Figure DI-2.
  - (b) Position the tie strap head in the approximate location on the side of the counterweight as shown in Figure DI-2. Snug but do not tighten the tie straps (910) at this time.
- (8) Verify that the wire harness (890) is taut through the counterweight hole.
- (9) Secure the wire harness (890) to the counterweight by installing the tie strap (930) through the counterweight hole and around the wire harness (890) on both sides of the counterweight. Position the tie strap head in the approximate location shown in Figure DI-2.
- (10) Tighten all of the tie straps (910 and 930).
- (11) Using the screw (220), washers (200 and/or 210), and nut (190), attach the terminal strip (170) to the bulkhead in accordance with Figure DI-3 and Figure DI-4.
  - (a) Torque screw (220) 10-12 In-Lbs (1.1-1.3 N•m).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-480-3**

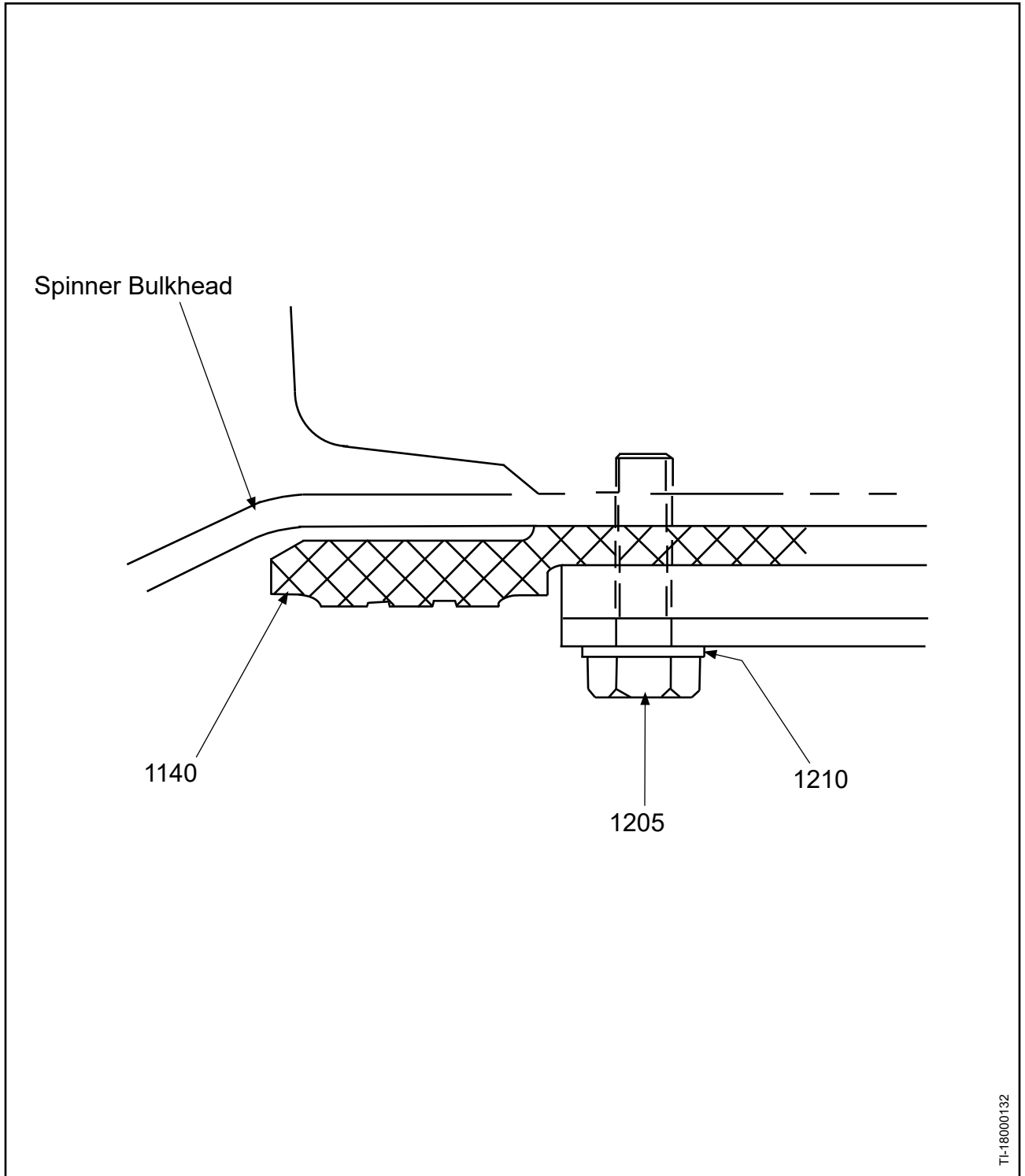
DI. Installation Instruction 11DI - continued

- (12) Install the slip ring lead wires and de-ice wire harness (890) to the terminal strip (170) in accordance with the applicable configuration and Figure DI-5.
- (13) Tighten the terminal screws until snug.
- (14) Install the clamp (590), around the wire harness (890).
- (15) Position the centerline of the clamp (590) parallel to the terminal strip (170) in accordance with Figure DI-6.
- (16) Using the screw (610), washers (620 and/or 630), and nut (600), attach the clamp (590) to the bulkhead in accordance with Figure DI-4 and Figure DI-7
  - (a) Torque the screw (610) to 22-25 In-Lbs (2.48-2.82 N•m).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-480-3**



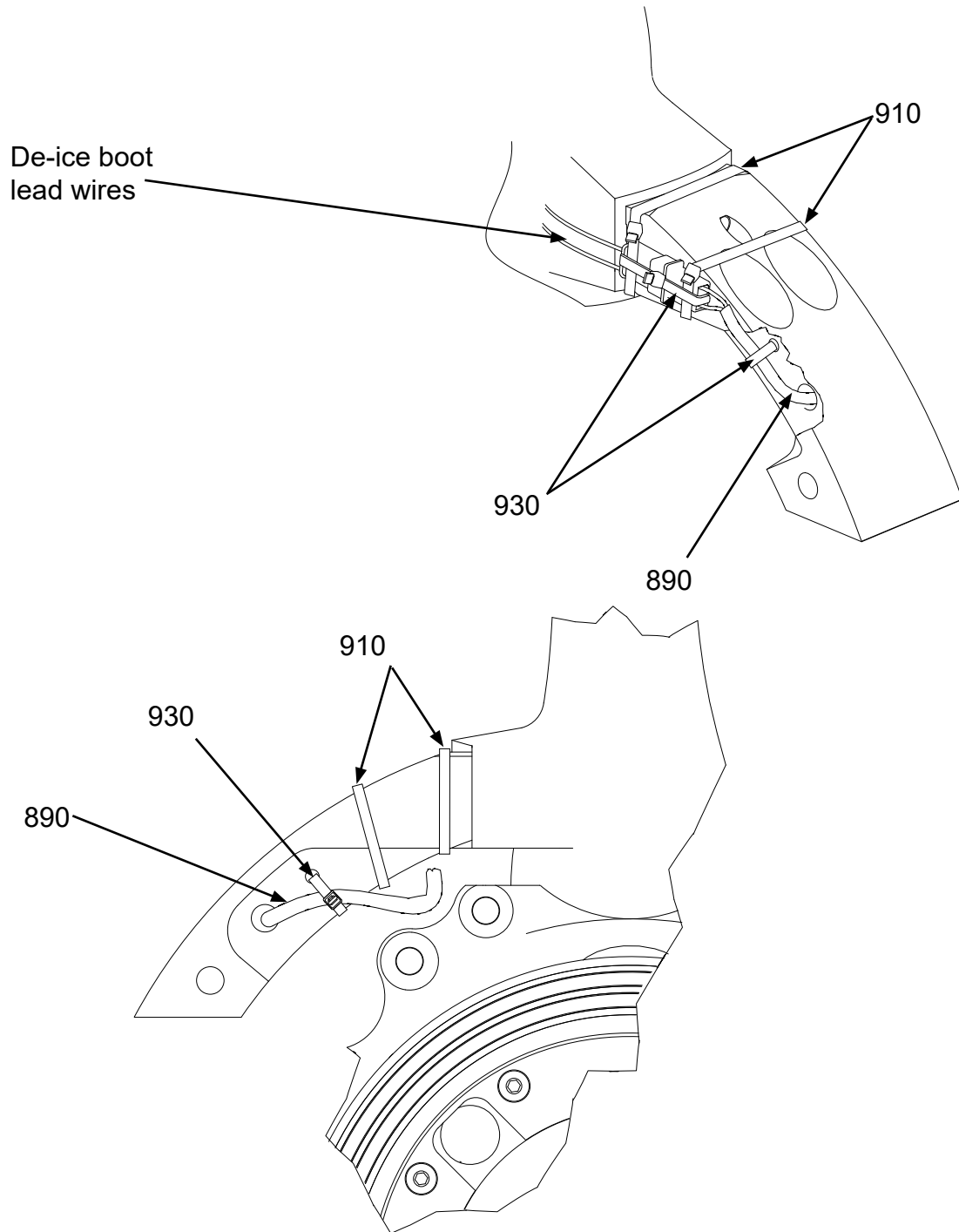
**Slip Ring Mounting  
Figure DI-1**

TI-18000132

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-480-3**



TI-180100119-1  
TI-180100120

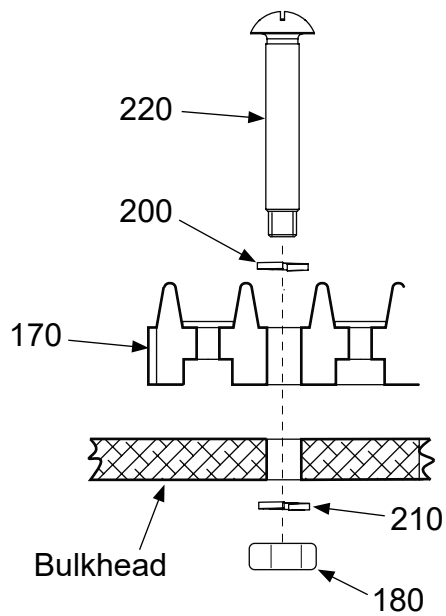
**Wire Harness to Counterweight  
Figure DI-2**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-480-3**



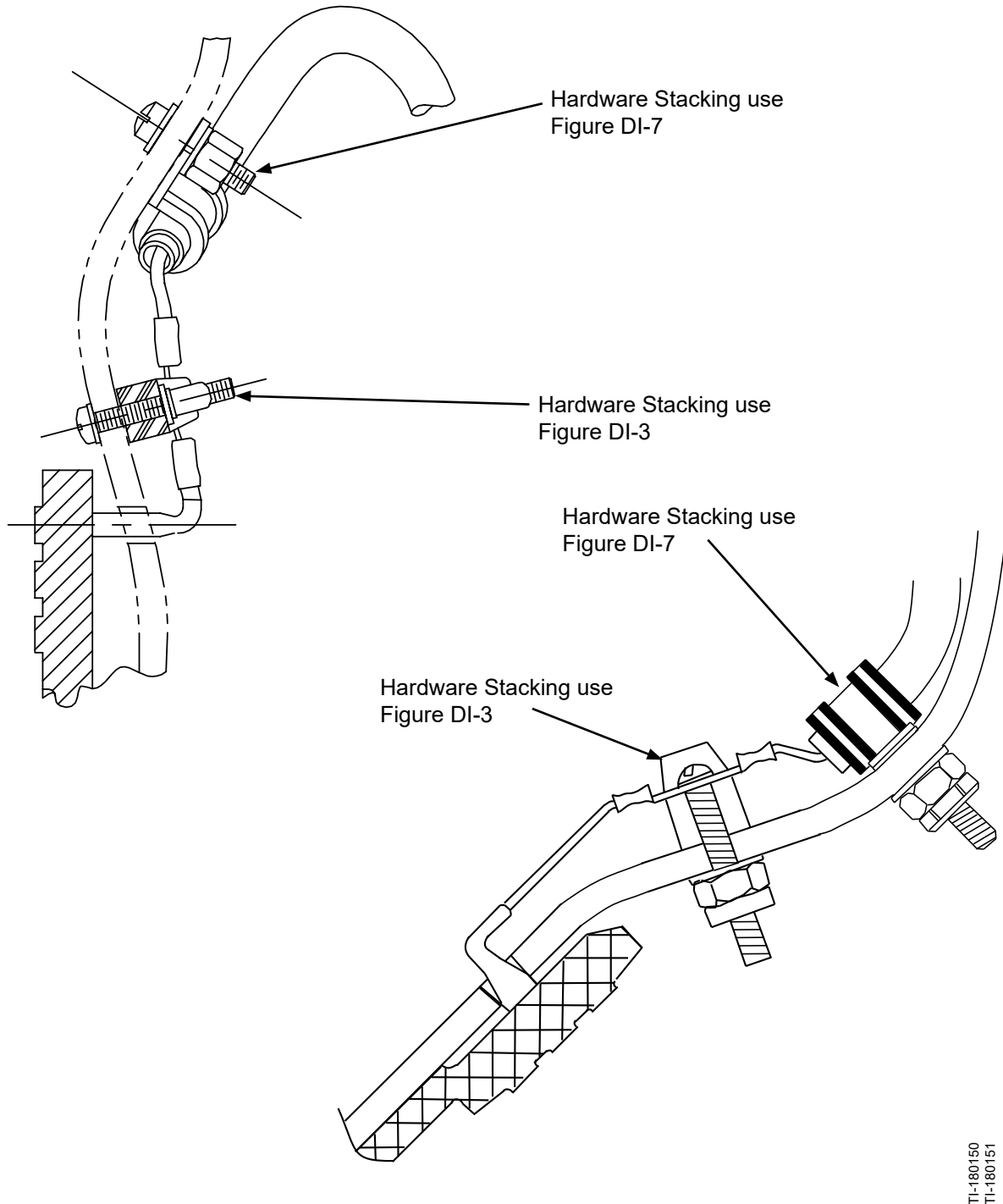
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TPI-MB-0135

**Terminal Strip Hardware Configuration: Bulkhead Mounted  
Figure DI-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-480-3**

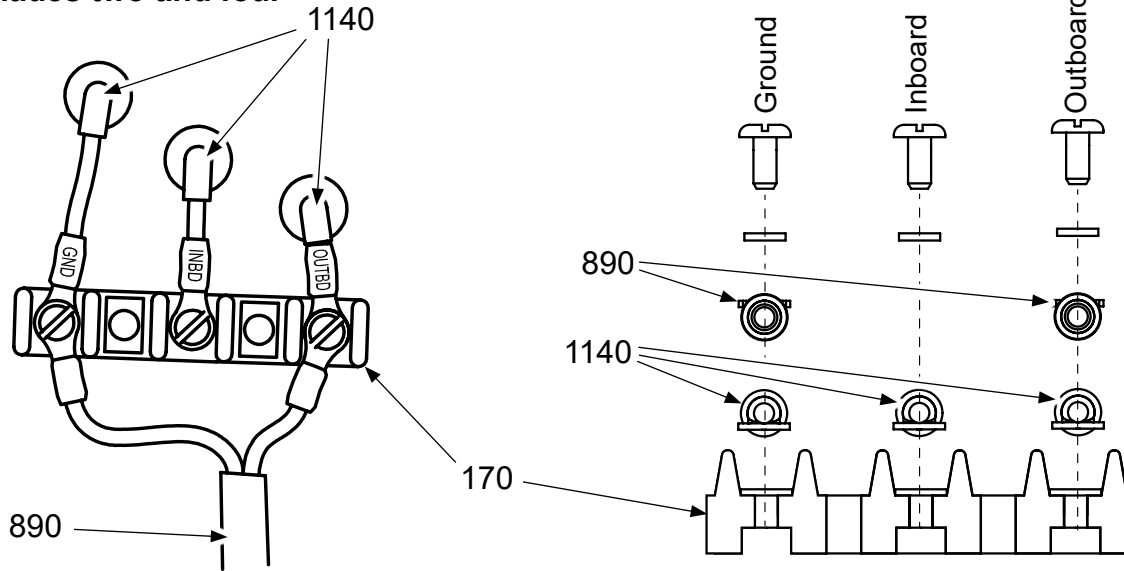


**Terminal Strip and Loop Clamp to Bulkhead Attachment  
Figure DI-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

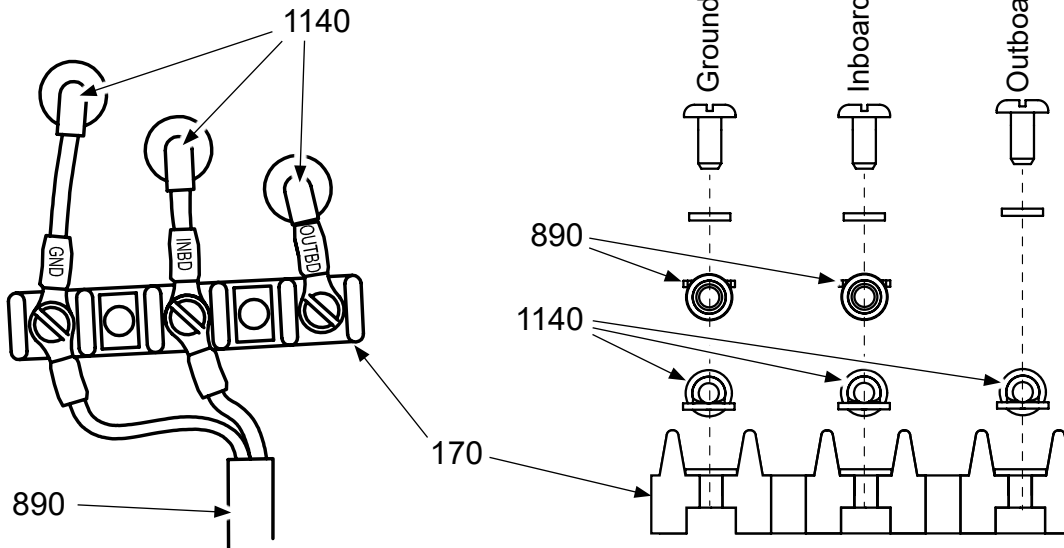
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-480-3**

**Blades two and four**



**NOTE:** The illustrations show slip ring wires on a typical right-hand (rotation) propeller.

**Blades one and three**



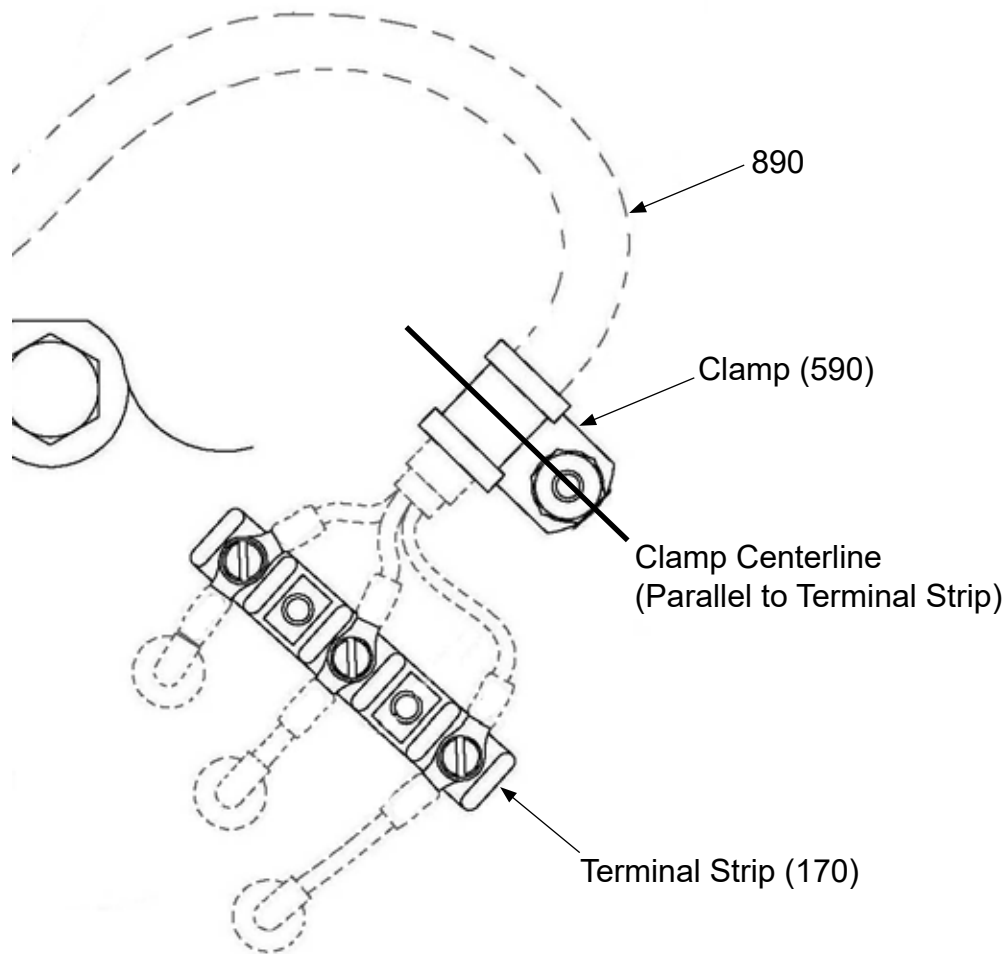
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**Terminal Strip Lead Wire Configuration: Crossfire Configuration A  
Figure DI-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-480-3**



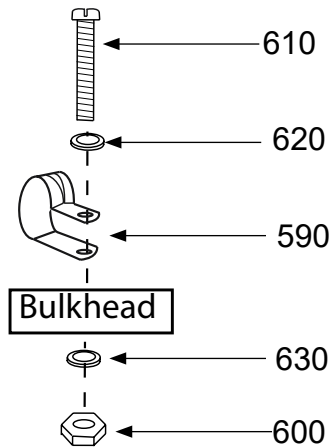
**NOTE:** This figure illustrates the orientation of the clamp to the terminal strip. Wire harness/slip ring wires are shown for reference only. Actual wire harness may have two or three wires.

TPLMB-0310

**Loop Clamp Orientation  
Figure DI-6**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-480-3**



TI-00180BC

**Loop Clamp to Bulkhead Hardware Configuration  
Figure DI-7**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-480-3**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-480-3</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) SUPERSEDED BY 106309, POST HC-SB-30-366 INSTALLATION INSTRUCTION 11DI FIGURES: DI-1 thru DI-7</b>		
170	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY ITEM 170A	4	
170A	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES ITEM 170	4	
180	B-6655-06	• NUT, HEX, SELF-LOCKING	8	Y
200	B-3854-41	• WASHER, LOCK	8	Y
210	B-3837-N616	• WASHER, CORROSION RESISTANT	8	Y
220	B-6631-232	• SCREW, 6-32, FILLISTER HEAD, CRES	8	Y
590	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	4	Y
600	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
610	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
620	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
630	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
890	7931-3E2092-4	• WIRE HARNESS SUPERSEDED BY ITEM 890A	4	Y
890A	3H2092-4	• WIRE HARNESS SUPERSEDES ITEM 890	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	8	Y
1140	7931-4E2661-4	• SLIP RING ASSEMBLY SUPERSEDED BY ITEM 1140A	1	
1140A	4H2661-4	• SLIP RING ASSEMBLY SUPERSEDES ITEM 1140	1	
1205	B-3384-9H	• BOLT, HEX HEAD	8	Y
1210	B-3851-0432	• WASHER, FLAT	8	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 7931-67-480-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-500-3**

DJ. Installation Instruction 11DJ

- (1) Refer to the de-ice kit installation instructions provided by the TC or STC holder (Machen).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-500-3**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-500-3</b>	<b>PROPELLER DE-ICE KIT INSTALLATION INSTRUCTION 11DJ</b>		
	B-6655-06	• NUT, HEX, SELF-LOCKING	8	Y
	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH	24	Y
	B-7035-14	• SCREW, 6-32, PAN HEAD, BRASS	8	
	2H1260	• INSULATING BUSHING SUPERSEDES 7931-2E1260	16	
	7931-2E1260	• INSULATING BUSHING SUPERSEDED BY 2H1260	16	
	B-6641-265	• NUT, HEX, BRASS	16	Y
	B-6637-30	• SCREW, PAN HEAD, CRES	8	
	3H1271-2	• CLIP, LEAD STRAP SUPERSEDES 7931-3E1271-2	4	
	7931-3E1271-2	• CLIP, LEAD STRAP SUPERSEDED BY 3H1271-2	4	
	B-3837-N632	• WASHER, CORROSION RESISTANT	16	Y
	7931-2E1306	• RUBBER CUSHION	4	
	2H1307	• WIRE HARNESS CUSHION SUPERSEDES 7931-2E1307	4	
	7931-2E1307	• WIRE HARNESS CUSHION SUPERSEDED BY 2H1307	4	
	7931-200-M88S	• QS-200-M88S HOSE CLAMP	2	
	7931-3E1557	• DE-ICE RUBBER SPACER	4	
	3H2050-2	• DE-ICE WIRE HARNESS SUPERSEDES 7931-3E2050-2	4	Y
	7931-3E2050-2	• DE-ICE WIRE HARNESS SUPERSEDED BY 3H2050-2	4	Y
	7931-3E2070	• SLIP RING WIRE HARNESS	4	
	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	8	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 7931-67-500-3**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-530-1 and 7931-67-535-1**

**DK.    Installation Instruction 11DK**

- (1) Using the screws (1170), attach the slip ring (1140) and the bulkhead to the hub as shown in Figure DK-1.
  - (a) Torque each screw (1170) 96-120 In-Lbs (10.1-13.5 N•m).
  - (b) Perform slip ring run-out check in accordance with the Check chapter in this manual.
- (2) Position the propeller blades at reverse blade angle.
- (3) Assemble the plug connection between the wire harness (890) and the de-ice boot.
- (4) Install the tie strap (930) around the wire harness/de-ice boot plug connection.
- (5) Position the tie strap head (930) in approximate location shown in Figure DK-2.
- (6) Secure the wire harness/boot connection to the counterweight.
  - (a) Install one tie strap (910) under the tie strap (930) connecting the wire harness/boot plugs, and around the counterweight as shown in Figure DK-2.
  - (b) Position the tie strap head in the approximate location on the side of the counterweight as shown in Figure DK-2.
  - (c) Tighten the tie straps (910 and 930) at this time.
- (7) Route the tie strap (930) through the hole in the counterweight rib, as shown in Figure DK-2.
- (8) Route the wire harness around the counterweight rib between the holes as shown in Figure DK-2.
- (9) Remove excess slack in the wire harness (890).
- (10) Secure the wire harness (890) to the counterweight by installing the tie strap (930) through the counterweight holes and around the wire harness (890) on both sides of the counterweight.
  - (a) Position the tie strap head in the approximate location shown in Figure DK-2.
- (11) Tighten all of the tie straps (930).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

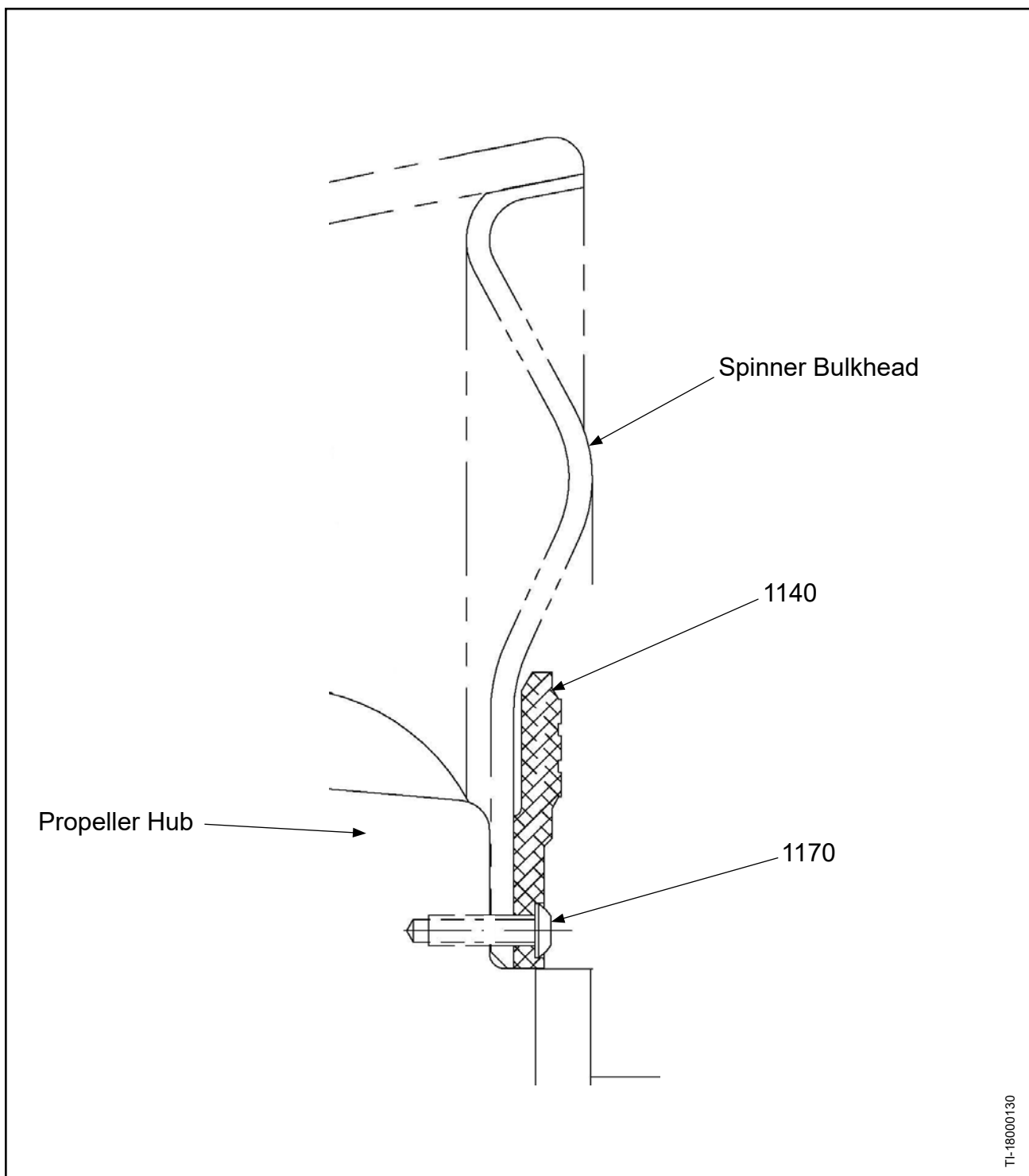
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-530-1 and 7931-67-535-1**

**DK. Installation Instruction 11DK - continued**

- (12) Install one tie strap (910) under the tie strap connecting the wire harness/boot plugs, outboard of the first tie strap (910), around the counterweight and over the wire harness (890). Tighten the tie strap.
- (13) Bond the de-ice boot lead wires to the blade in accordance with the De-ice Boot Removal/Installation chapter in this manual.
- (14) Using the screw (220), washers (200 and/or 210), and nut (180), attach the terminal strip (170) to the bulkhead in accordance with Figure DK-3 and Figure DK-4.
  - (a) Torque the screw (220) to 10-12 In-Lbs (1.1-1.3 N•m).
- (15) Install the slip ring lead wires and de-ice wire harness (890) to the terminal strip (170) in accordance with Figure DK-5.
  - (a) Tighten the terminal screws until snug.
- (17) Install the clamp (590), around the wire harness (890).
- (18) Position the centerline of the clamp (590) parallel to terminal strip (170) in accordance with Figure DK-6.
- (18) Using the screw (610), washers (620 and/or 630), and nut (600), attach the clamp (590) to the bulkhead in accordance with Figure DK-7.
  - (b) Torque the screw (610) to 22-25 In-Lbs (2.48-2.82 N•m).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

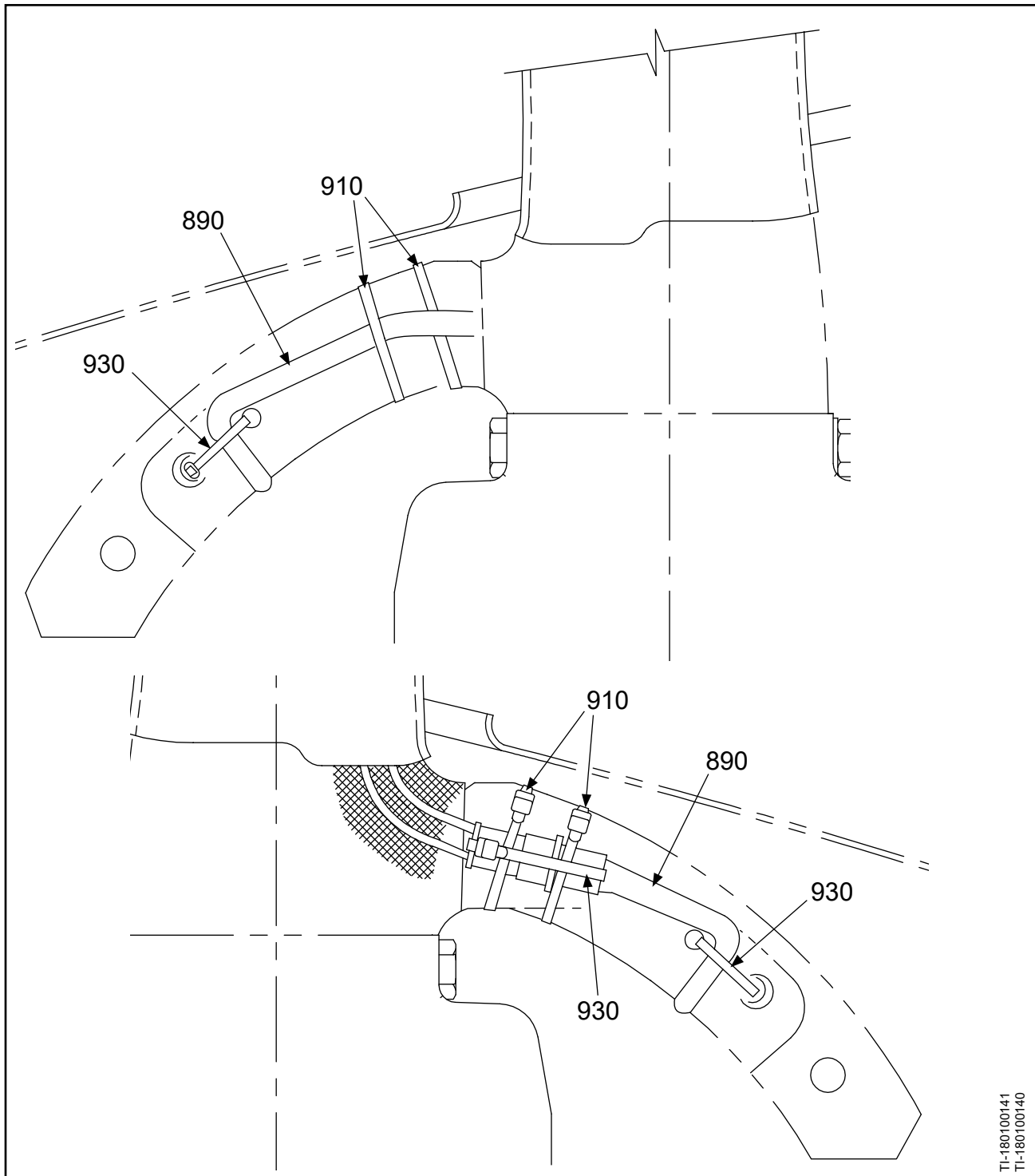
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-530-1 and 7931-67-535-1**



**Slip Ring Mounting  
Figure DK-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

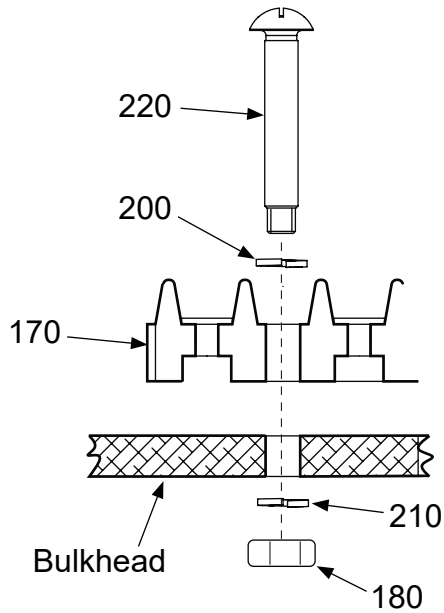
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-530-1 and 7931-67-535-1**



**Wire Harness to Counterweight  
Figure DK-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-530-1 and 7931-67-535-1**

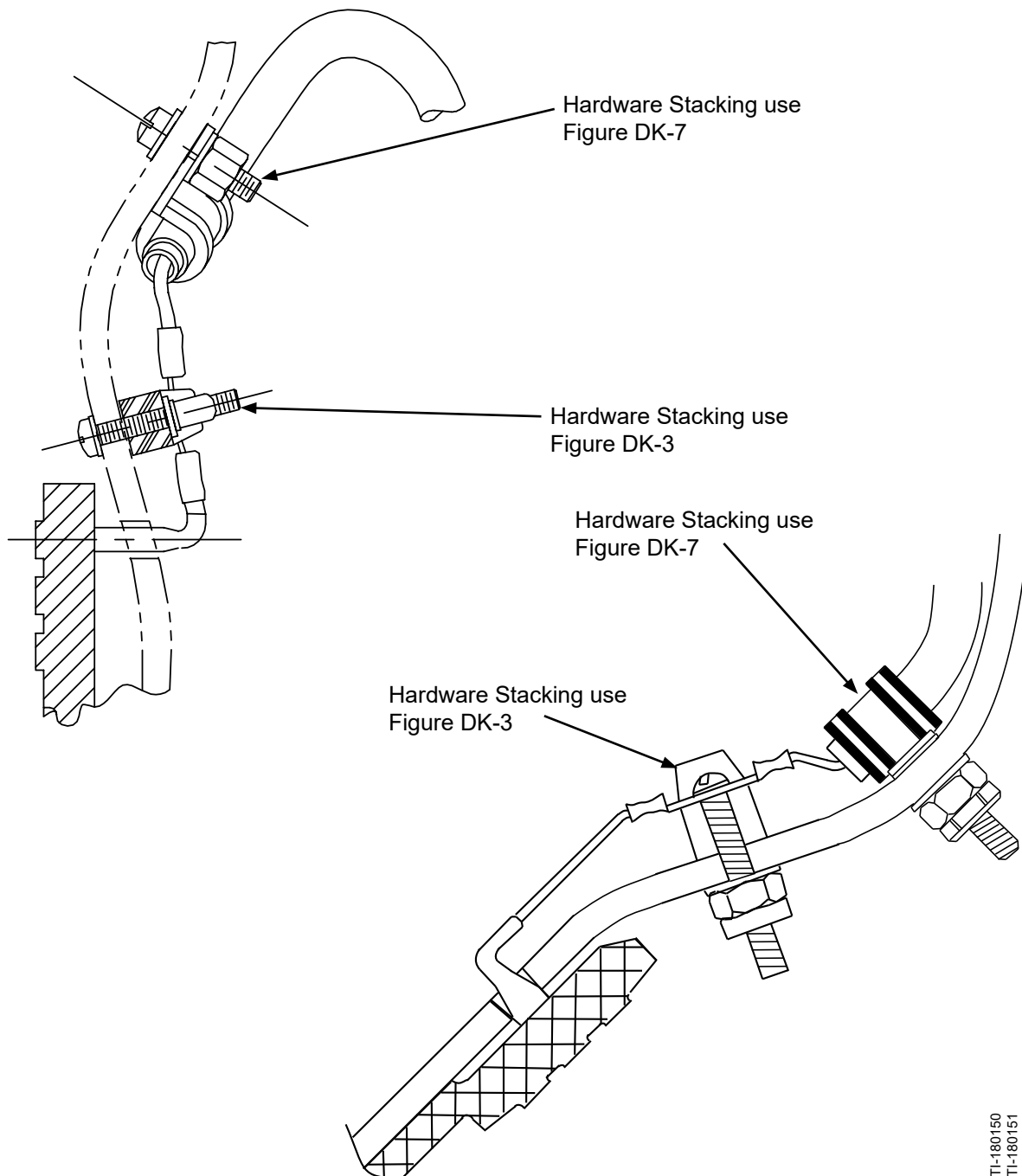


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**Terminal Strip Hardware Configuration: Bulkhead Mounted  
Figure DK-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-530-1 and 7931-67-535-1**

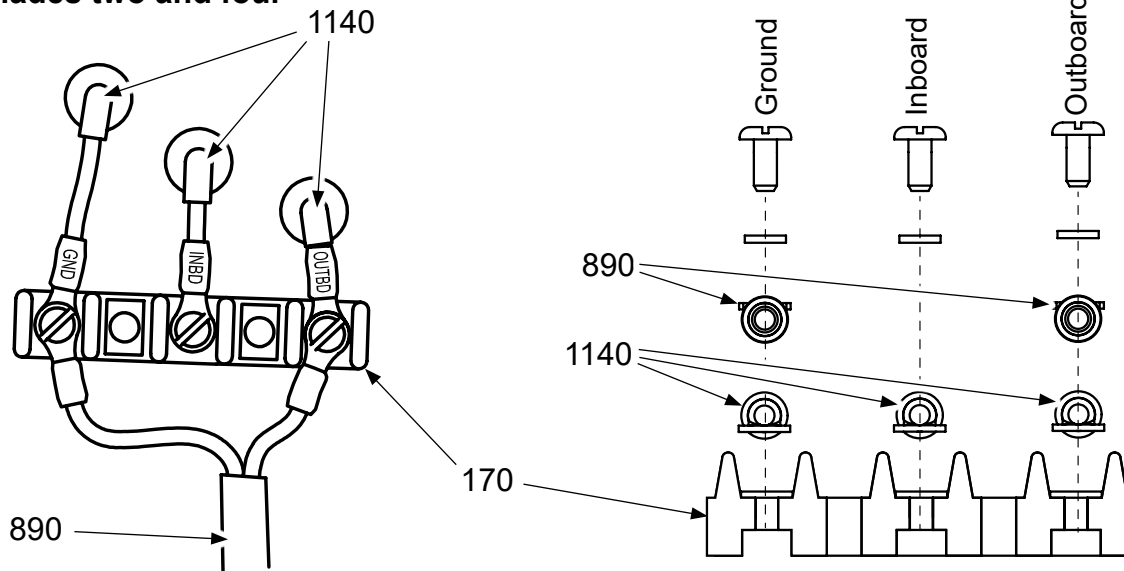


**Terminal Strip and Loop Clamp to Bulkhead Attachment  
Figure DK-4**

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

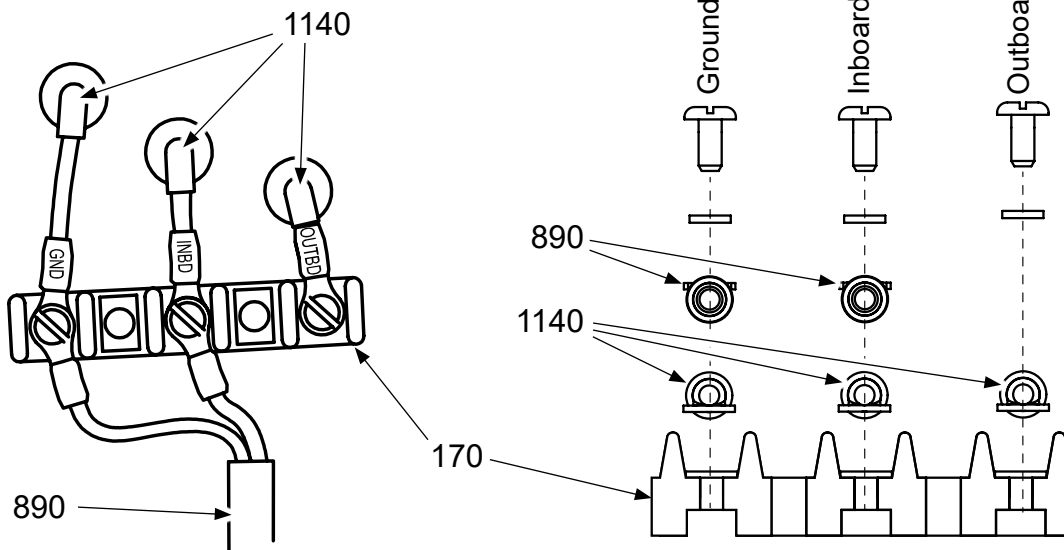
This section includes the parts list(s) and installation instructions for the following electric de-ice kit(s):  
**7931-67-530-1 and 7931-67-535-1**

## Blades two and four



**NOTE:** The illustrations show slip ring wires on a typical right-hand (rotation) propeller.

## Blades one and three

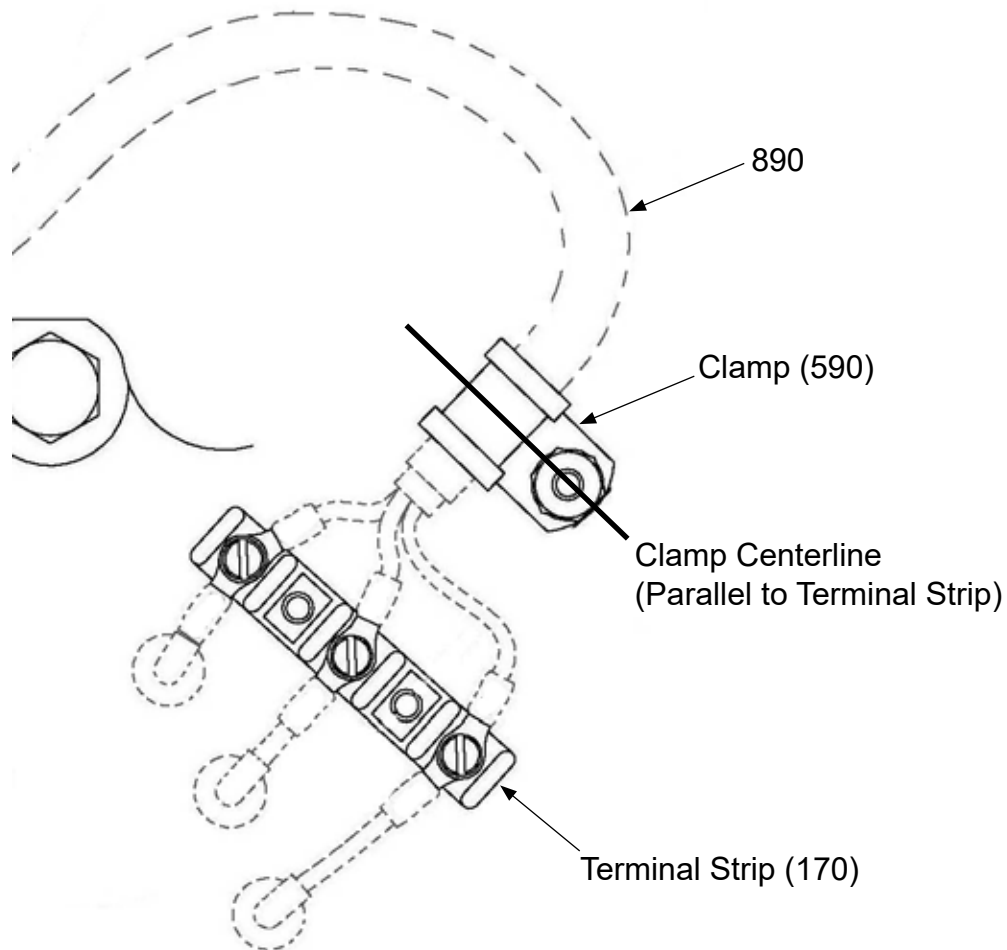


## Crossfire Configuration A

**Terminal Strip Lead Wire Configuration: Bulkhead Mounted  
Figure DK-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-530-1 and 7931-67-535-1**



**NOTE:** This figure illustrates the orientation of the clamp to the terminal strip.  
Wire harness/slip ring wires are shown for reference only.  
Actual wire harness may have two or three wires.

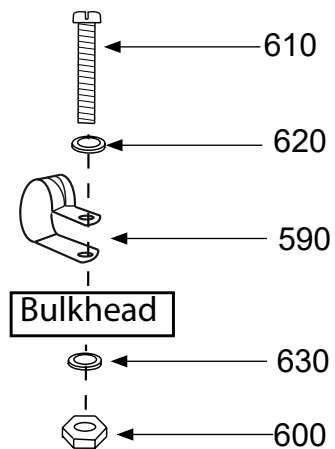
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**Loop Clamp Orientation  
Figure DK-6**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-530-1 and 7931-67-535-1**



TI-00180BC

**Loop Clamp to Bulkhead Hardware Configurations  
Figure DK-7**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-530-1 and 7931-67-535-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-530-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) ALTERNATE FOR 7931-67-535-1 SUPERSEDED BY 106308, POST HC-SB-30-366 INSTALLATION INSTRUCTION 11DK FIGURES: DK-1 thru DK-7</b>		
170	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY ITEM 170A	4	
170A	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES ITEM 170	4	
180	B-6655-06	• NUT, HEX, SELF-LOCKING	8	Y
200	B-3854-41	• WASHER, LOCK	8	Y
210	B-3837-N632	• WASHER, CORROSION RESISTANT	8	Y
220	B-6631-232	• SCREW, 6-32, FILLISTER HEAD, CRES	8	Y
590	B-6735	• CLAMP, LOOP, CUSHIONED	4	Y
600	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
610	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
620	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
630	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
890	7931-3E2383-7	• DE-ICE WIRE HARNESS SUPERSEDED BY ITEM 890A	4	Y
890A	3H2383-7	• DE-ICE WIRE HARNESS SUPERSEDES ITEM 890	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	8	Y
1140	7931-4E2661-1	• SLIP RING ASSEMBLY SUPERSEDED BY ITEM 1140A		1
1140A	4H2661-1	• SLIP RING ASSEMBLY SUPERSEDES ITEM 1140	1	
1170	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	8	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 7931-67-530-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-530-1 and 7931-67-535-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	7931-67-535-1	PROPELLER DE-ICE KIT (ONE PROP) REFER TO DE-ICE KIT 7931-67-530-1		

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 7931-67-535-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-530-1 and 7931-67-535-1**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-480-1, 7931-67-600-1, 102759-1, 103317, and 105537**

**DL.    Installation Instruction 11DL**

- (1) Using the screws (1170), attach the slip ring (1140) and the bulkhead to the hub as shown in Figure DL-1.
  - (a) Torque each screw (1170) 96-120 In-Lbs (10.1-13.5 N•m).
  - (b) Perform slip ring run-out check in accordance with the Check chapter in this manual.
- (2) Position the propeller blades at reverse blade angle.
- (3) Assemble the plug connection between the wire harness (890) and the de-ice boot.
- (4) Install the tie strap (925) around the wire harness/de-ice boot plug connection.
- (5) Position the tie strap head (925) in approximate location shown in Figure DL-2.
- (6) Route the terminal end of the wire harness (890) through the hole in counterweight rib, as shown in Figure DL-2.
- (7) Secure the wire harness/boot connection to the counterweight.
  - (a) Install tie straps (910) under the tie strap (925) connecting the wire harness/boot plugs, and around the counterweight as shown in Figure DL-2.
  - (b) Position the tie strap head in the approximate location on the side of the counterweight as shown in Figure DL-2. Snug but do not tighten the tie straps (910) at this time.
- (8) Verify that the wire harness (890) is taut through the counterweight hole.
- (9) Secure the wire harness (890) to the counterweight by installing the tie strap (930) through the counterweight hole and around the wire harness (890) on both sides of the counterweight. Position the tie strap head in the approximate location shown in Figure DL-2.
- (10) Tighten all of the tie straps (910, 925, and 930).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

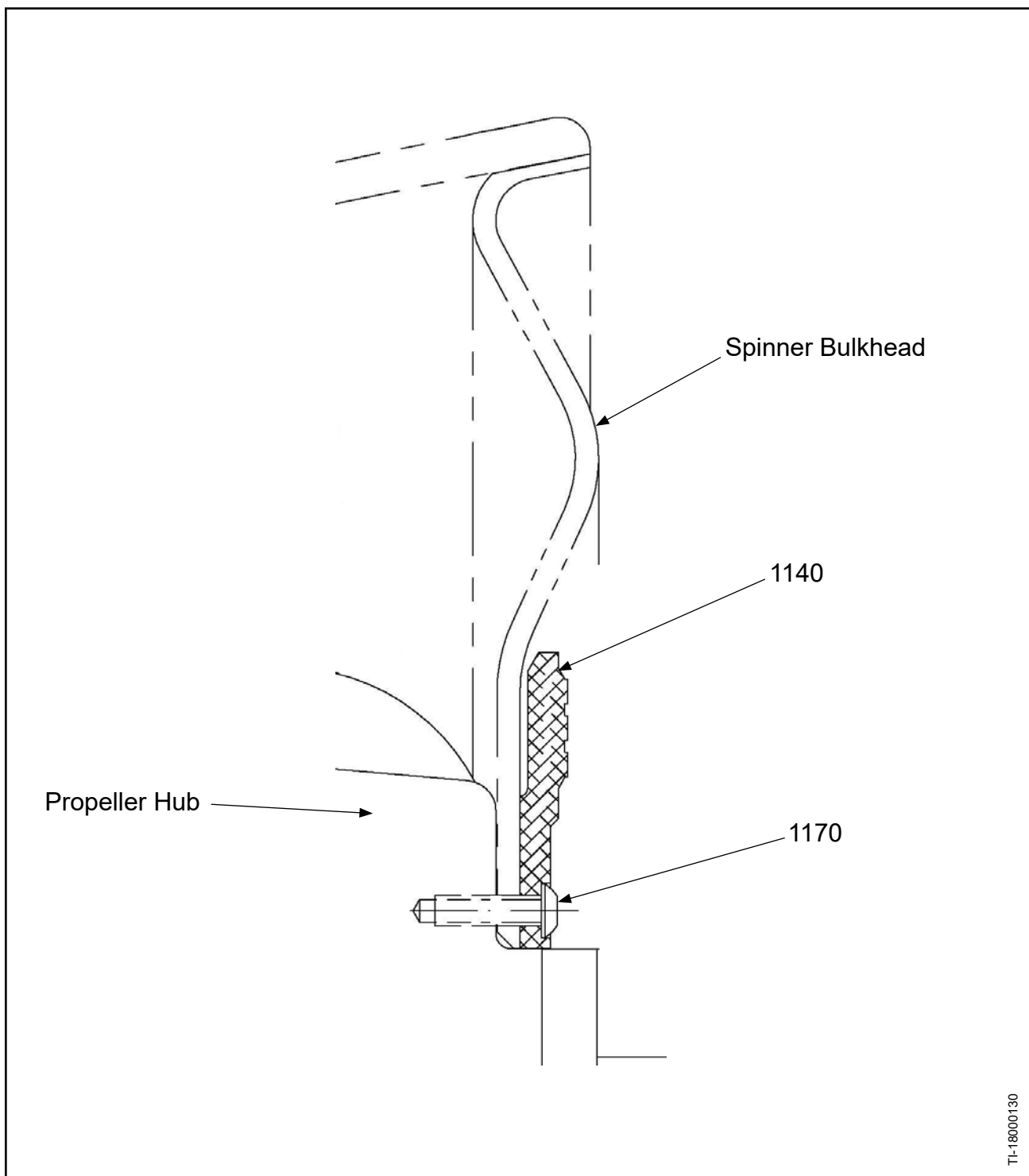
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-480-1, 7931-67-600-1, 102759-1, 103317, and 105537**

**DL.    Installation Instruction 11DL - continued**

- (12) Using the screw (220), washers (200 and/or 210), and nut (180) or tapped eyellet (190), attach the terminal strip (170) to the bulkhead in accordance with Figure DL-3 and the configuration specified below:
  - (a) 7931-67-480-1: Configuration B
  - (b) 7931-67-600-1: Configuration B
  - (c) 102759-1: Configuration A
  - (d) 103317: Configuration A
  - (e) 105537: Configuration A
- (13) Torque the screw (220) to 10-12 In-Lbs (1.1-1.3 N•m).
- (14) Install the slip ring lead wires and de-ice wire harness (890) to the terminal strip (170) in accordance with the applicable Figure specified below:
  - (a) 7931-67-480-1: Figure DL-5 (Crossfire Configuration A)
  - (b) 7931-67-600-1: Figure DL-5 (Crossfire Configuration A)
  - (c) 102759-1: Figure DL-4 (Typical Three-wire)
  - (d) 103317: Figure DL-5 (Crossfire Configuration A)
  - (e) 105537: Figure DL-4 (Typical Three-wire)
- (15) Tighten the terminal screws until snug.
- (16) Install the clamp (590), around the wire harness (890) in accordance with Figure DL-6 and Figure DL-7.
- (17) Position the centerline of the clamp (590) parallel to terminal strip (170) in accordance with Figure DL-7.
- (18) Using the screw (610), washers (620 and/or 630), and nut (600), attach the clamp (590) to the bulkhead in accordance with Figure DL-8 and the configuration specified below:
  - (a) 7931-67-480-1: Configuration B
  - (b) 7931-67-600-1: Configuration B
  - (c) 102759-1: Configuration A
  - (d) 103317: Configuration A
  - (e) 105537: Configuration A
- (19) Torque the screw (610) to 22-25 In-Lbs (2.48-2.82 N•m).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

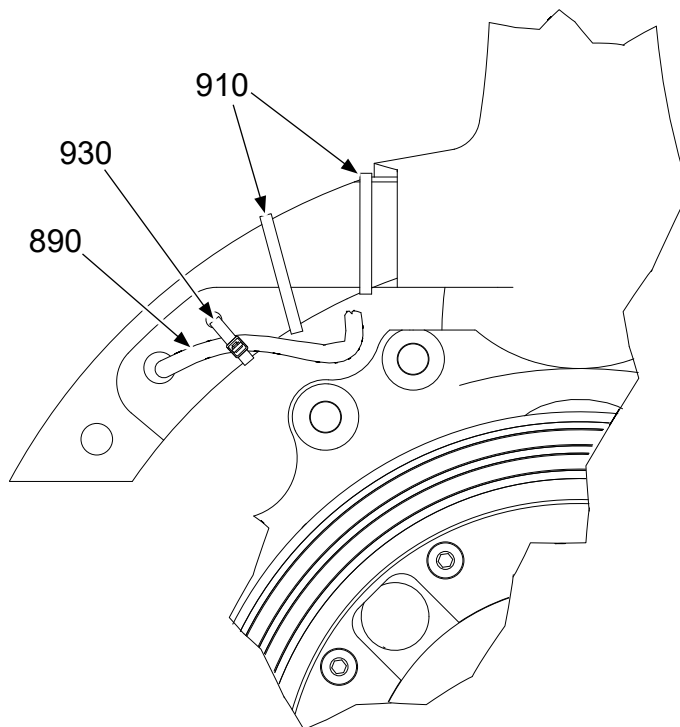
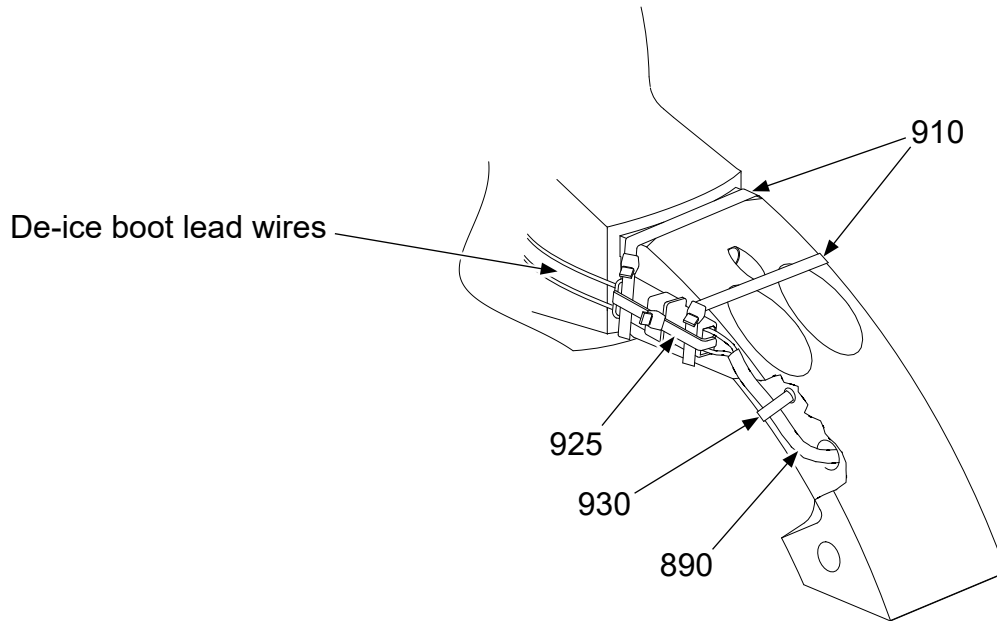
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-480-1, 7931-67-600-1, 102759-1, 103317, and 105537**



**Slip Ring Mounting  
Figure DL-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-480-1, 7931-67-600-1, 102759-1, 103317, and 105537**



TI-180100119-1  
TI-180100120

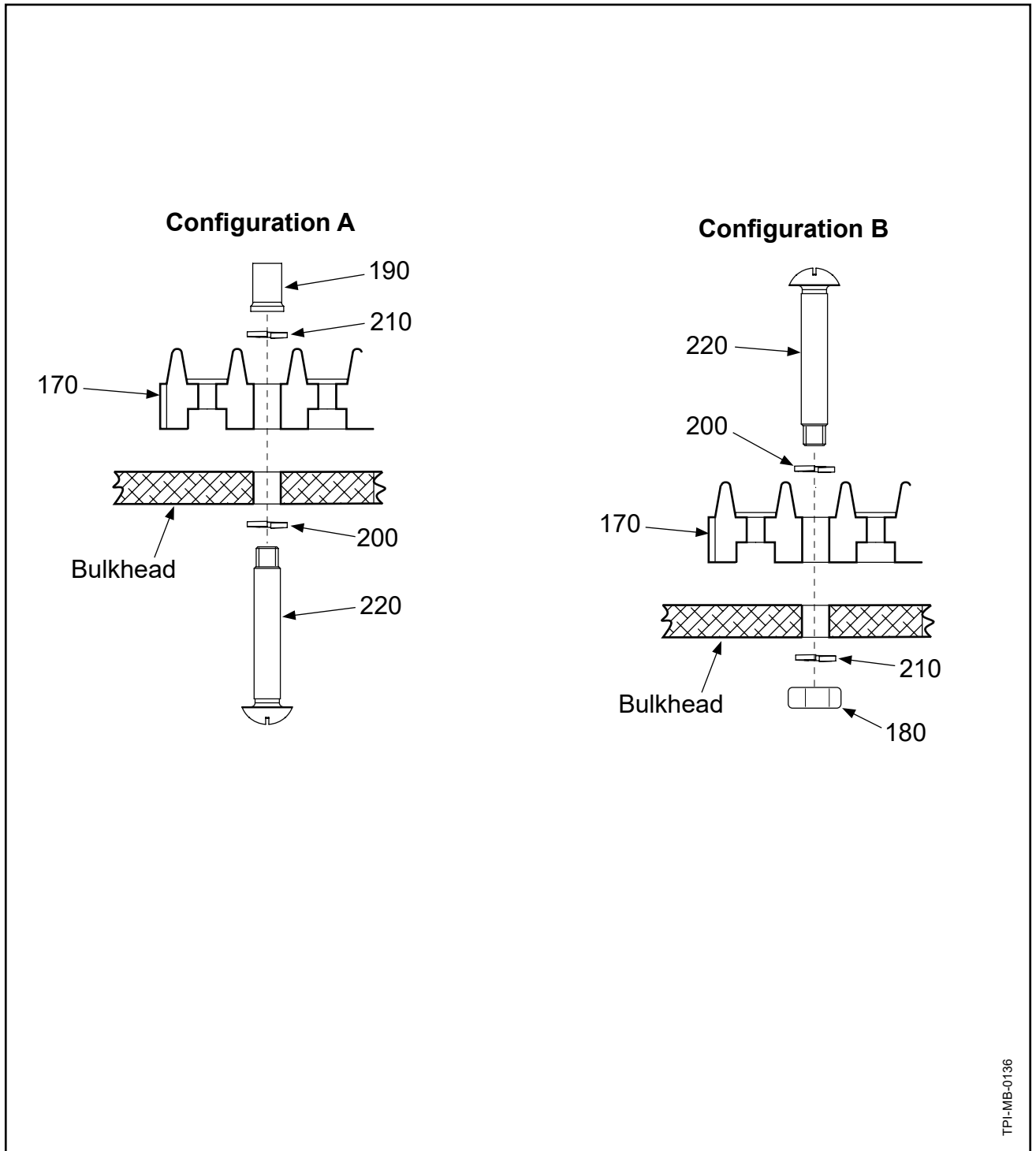
**Wire Harness to Counterweight  
Figure DL-2**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-480-1, 7931-67-600-1, 102759-1, 103317, and 105537**

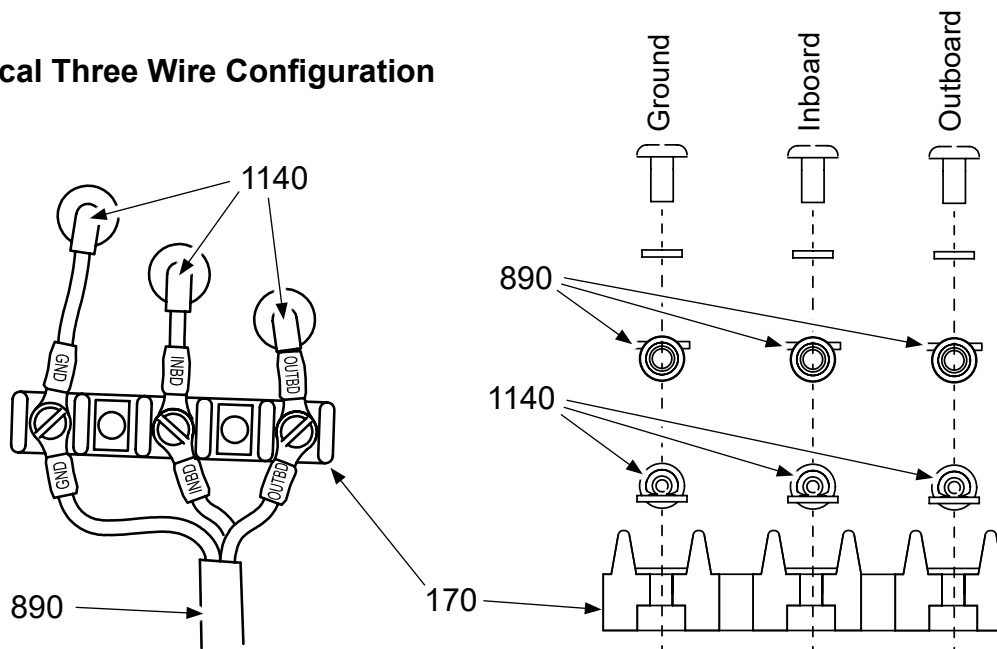


**Terminal Strip Hardware Configurations: Bulkhead Mounted  
Figure DL-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-480-1, 7931-67-600-1, 102759-1, 103317, and 105537**

**Typical Three Wire Configuration**



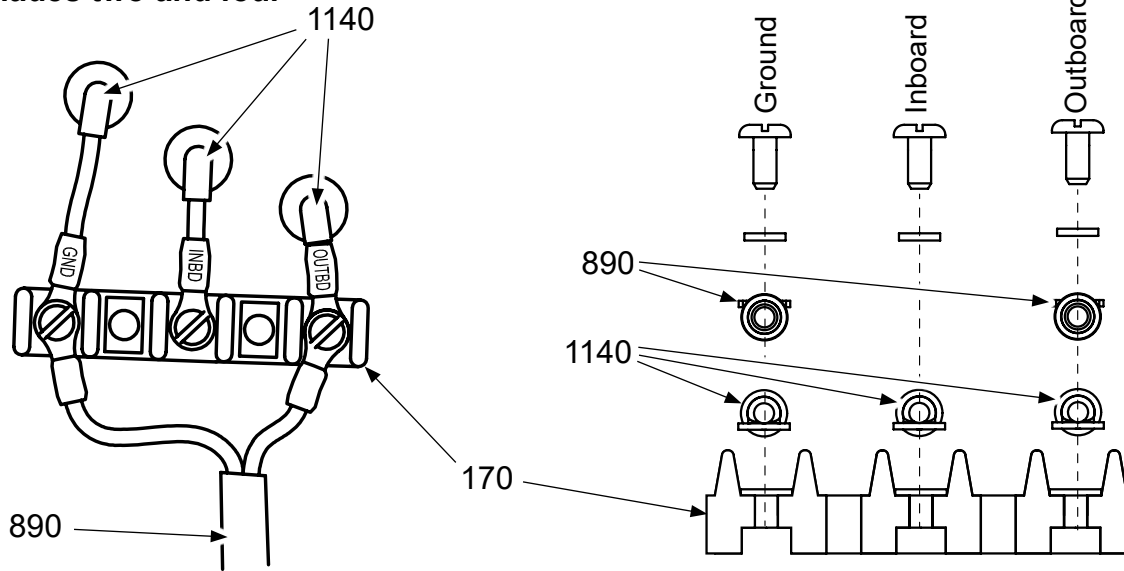
**NOTE:** The illustrations show slip ring wires on a typical right-hand (rotation) propeller.

**Terminal Strip Lead Wire Configuration: Typical Three-wire  
Figure DL-4**

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

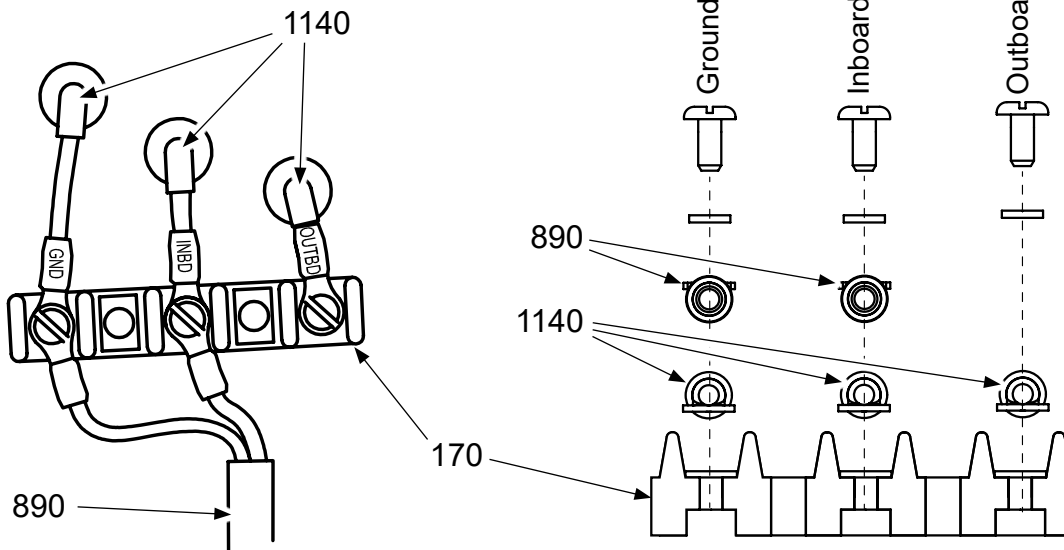
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-480-1, 7931-67-600-1, 102759-1, 103317, and 105537**

## Blades two and four



**NOTE:** The illustrations show slip ring wires on a typical right-hand (rotation) propeller.

## Blades one and three

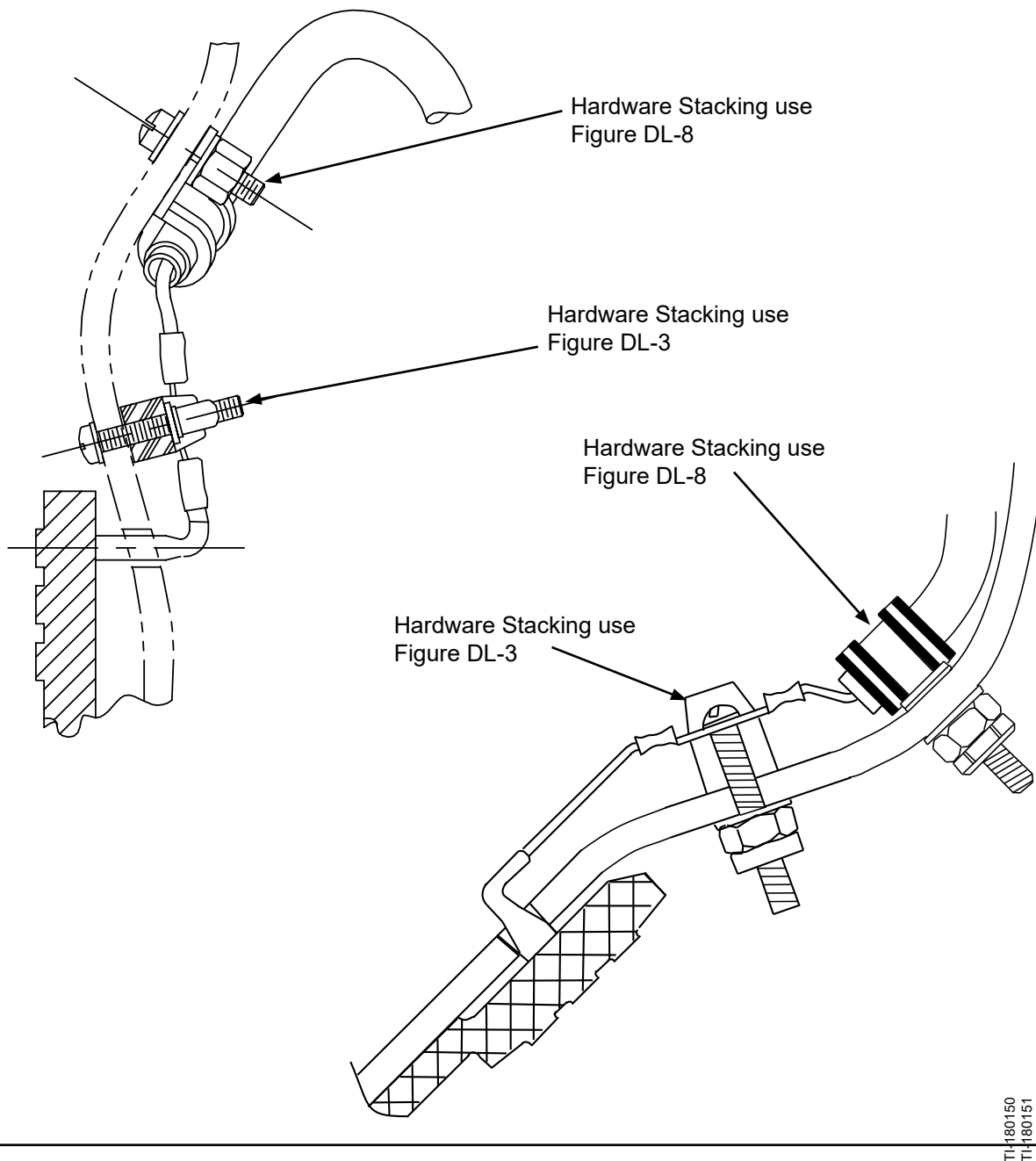


TPI-MB-0133

**Terminal Strip Lead Wire Configuration: Crossfire Configuration A**  
**Figure DL-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

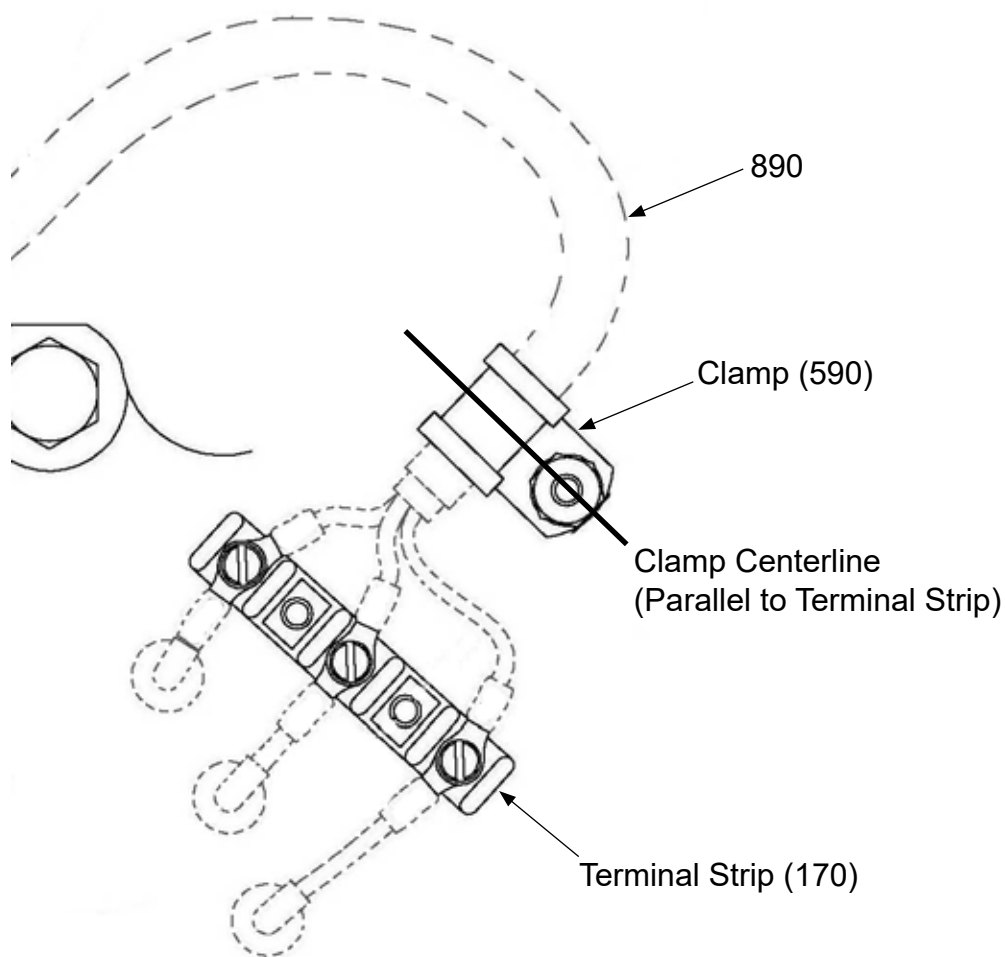
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-480-1, 7931-67-600-1, 102759-1, 103317, and 105537**



**Terminal Strip and Loop Clamp to Bulkhead Attachment  
Figure DL-6**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-480-1, 7931-67-600-1, 102759-1, 103317, and 105537**



**NOTE:** This figure illustrates the orientation of the clamp to the terminal strip. Wire harness/slip ring wires are shown for reference only. Actual wire harness may have two or three wires.

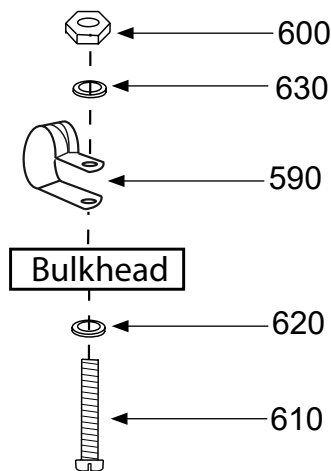
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**Loop Clamp Orientation  
Figure DL-7**

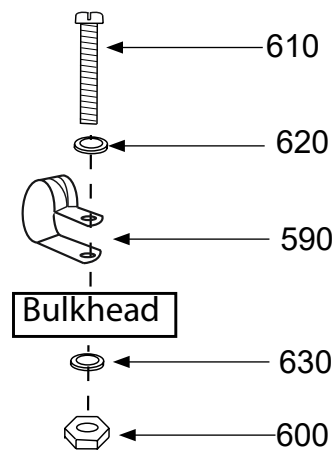
**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-480-1, 7931-67-600-1, 102759-1, 103317, and 105537**

**Configuration A**



**Configuration B**



TI-00180AC  
TI-00180BC  
TI-00180CC

**Loop Clamp to Bulkhead Hardware Configurations  
Figure DL-8**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-480-1, 7931-67-600-1, 102759-1, 103317, and 105537**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-480-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) SUPERSEDED BY 106308, POST HC-SB-30-366 INSTALLATION INSTRUCTION 11DL FIGURES DL-1 thru DL-3, DL-5 thru DL-8</b>		
170	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY ITEM 170A	4	
170A	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES ITEM 170	4	
180	B-6655-06	• NUT, HEX, SELF-LOCKING	8	Y
200	B-3854-41	• WASHER, LOCK	8	Y
210	B-3837-N616	• WASHER, CORROSION RESISTANT	8	Y
220	B-6631-232	• SCREW, 6-32, FILLISTER HEAD, CRES	8	Y
590	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	4	Y
600	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
610	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
620	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
630	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
890	7931-3E2092-4	• WIRE HARNESS SUPERSEDED BY ITEM 890A	4	Y
890A	3H2092-4	• WIRE HARNESS SUPERSEDES ITEM 890	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
925	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	4	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	4	Y
1140	7931-4E2661-1	• SLIP RING ASSEMBLY SUPERSEDED BY ITEM 1140A	1	
1140A	4H2661-1	• SLIP RING ASSEMBLY SUPERSEDES ITEM 1140	1	
1170	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	8	Y

- ITEM NOT ILLUSTRATED

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-480-1, 7931-67-600-1, 102759-1, 103317, and 105537**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-600-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) SUPERSEDED BY 106308, POST HC-SB-30-366 INSTALLATION INSTRUCTION 11DL FIGURES: DL-1 thru DL-3, DL-5 thru DL-8</b>		
170	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY ITEM 170A	4	
170A	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES ITEM 170	4	
180	B-6655-06	• NUT, HEX, SELF-LOCKING	8	Y
200	B-3854-41	• WASHER, LOCK	8	Y
210	B-3837-N616	• WASHER, CORROSION RESISTANT	8	Y
220	B-6631-232	• SCREW, 6-32, FILLISTER HEAD, CRES	8	Y
590	B-6735	• CLAMP, LOOP, CUSHIONED	4	Y
600	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
610	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
620	B-3855-31	• WASHER, LOCK	4	Y
630	B-3855-31	• WASHER, LOCK	4	Y
890	7931-3E2383-4	• DE-ICE WIRE HARNESS SUPERSEDED BY ITEM 890A	4	Y
890A	3H2383-4	• DE-ICE WIRE HARNESS SUPERSEDES ITEM 890	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
925	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	4	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	4	Y
1140	7931-4E2661-1	• SLIP RING ASSEMBLY SUPERSEDED BY ITEM 1140A	1	
1140A	4H2661-1	• SLIP RING ASSEMBLY SUPERSEDES ITEM 1140	1	
1170	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	8	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 7931-67-600-1**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-480-1, 7931-67-600-1, 102759-1, 103317, and 105537**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>102759-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11DL</b> <b>FIGURES: DL-1 thru DL-4, DL-6 thru DL-8</b>		
170	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM	4	
190	2H1365	• TAPPED EYELET	8	Y
200	B-3854-41	• WASHER, LOCK	8	Y
210	B-3854-41	• WASHER, LOCK	8	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	8	Y
590	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	4	Y
600	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
610	B-3856-248	• SCREW, 8-32, WASHER HEAD	4	Y
620	B-3854-42	• WASHER, LOCK	4	Y
630	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
890	4H2369-4	• WIRE HARNESS	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
925	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	4	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	4	Y
1140	4H2661-1	• SLIP RING ASSEMBLY	1	
1170	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	8	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 102759-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-480-1, 7931-67-600-1, 102759-1, 103317, and 105537**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>103317</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>SUPERSEDED BY 106308, POST HC-SB-30-366</b> <b>INSTALLATION INSTRUCTION 11DL</b> <b>FIGURES: DL-1 thru DL-3, DL-5 thru DL-8</b>		
170	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM	4	
190	2H1365	• TAPPED EYELET	8	Y
200	B-3854-41	• WASHER, LOCK	8	Y
210	B-3854-41	• WASHER, LOCK	8	Y
220	B-6637-34	• SCREW, PAN HEAD	8	Y
590	B-6735	• CLAMP, LOOP, CUSHIONED	4	Y
600	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
610	B-3856-248	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
620	B-3854-42	• WASHER, LOCK	4	Y
630	B-3837-N832	• WASHER, CRESCENT	4	Y
890	3H2383-4	• DE-ICE WIRE HARNESS	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
925	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	4	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	4	Y
1140	4H2661-1	• SLIP RING ASSEMBLY	1	
1170	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	8	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 103317**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-480-1, 7931-67-600-1, 102759-1, 103317, and 105537**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>105537</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11DL FIGURES: DL-1 thru DL-4, DL-6 thru DL-8</b>		
170	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM	4	
190	2H1365	• TAPPED EYELET	8	Y
200	B-3854-41	• WASHER, LOCK	8	Y
210	B-3854-41	• WASHER, LOCK	8	Y
220	B-6637-34	• SCREW, PAN HEAD	8	Y
590	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	4	Y
600	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
610	B-3856-248	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
620	B-3854-42	• WASHER, LOCK	4	Y
630	B-3837-N832	• WASHER, CRESCENT	4	Y
890	105623	• DE-ICE WIRE HARNESS	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
925	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	4	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	4	Y
1140	4H2661-1	• SLIP RING ASSEMBLY	1	
1170	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	8	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 105537**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-480-1, 7931-67-600-1, 102759-1, 103317, and 105537**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-870-4**

**DM. Installation Instruction 11DM**

- (1) Using the bolts (1160) and washers (1210), attach the slip ring (1140), aircraft manufacturer's pulley set, and bulkhead to the hub as shown in Figure DM-1.
  - (a) Using CM118, A-6741-118, torque each bolt (1160) to 36-44 In-Lbs (4.1-4.9 N•m).
  - (b) Perform slip ring run-out check in accordance with the Check chapter in this manual.
- (2) Position the propeller blades at reverse blade angle.
- (3) Assemble the plug connection between the wire harness (890) and the de-ice boot.
- (4) Install the tie strap (930) around the wire harness/de-ice boot plug connection.
- (5) Position the tie strap head (930) in approximate location shown in Figure DM-2.
- (6) Route the terminal end of the wire harness (890) through the hole in counterweight rib, as shown in Figure DM-2.
- (7) Secure the wire harness/boot connection to the counterweight.
  - (a) Install tie straps (910) under the tie strap (930) connecting the wire harness/boot plugs, and around the counterweight as shown in Figure DM-2.
  - (b) Position the tie strap head in the approximate location on the side of the counterweight as shown in Figure DM-2.  
Do not tighten the tie strap (910) at this time.
- (8) Verify that the wire harness (890) is taut through the counterweight hole.
- (9) Secure the wire harness (890) to the counterweight by installing the tie strap (930) through the counterweight hole and over the wire harness (890) on both sides of the counterweight. Position the tie strap head in the approximate location shown in Figure DM-2.
- (10) Tighten all of the tie straps (910 and 930).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-870-4**

**DM. Installation Instruction 11DM - continued**

- (11) Secure the de-ice boot lead wires to the blade in accordance with step (11)(a) or (11)(b).

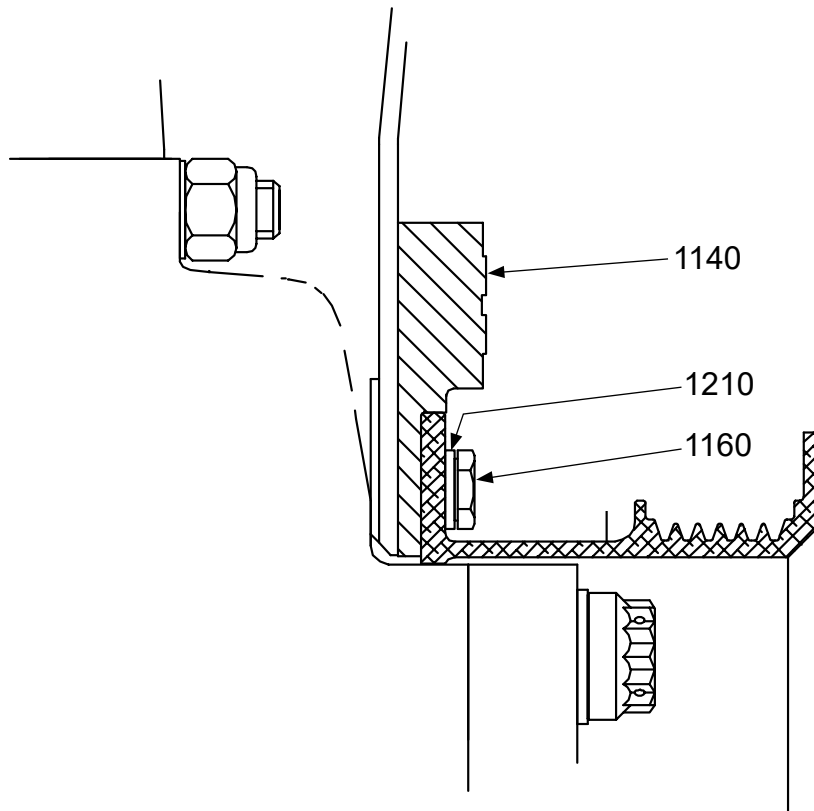
**NOTE:** Some de-ice boots are designed with a bent lead strap. Install the de-ice boot in accordance with the De-ice Boot Removal/Installation chapter in this manual.

- (a) If applicable, bond the de-ice boot wires to the blade in accordance with the De-ice Boot Removal/Installation chapter in this manual. Installation of tie straps (900) and (910) to secure the de-ice boot wires to the blade shank is not required.
- (b) Using tie straps (910) and (930):
- 1 If the de-ice boot has a bent lead strap, installation of tie straps (910) to secure the de-ice boot wires to the blade shank is not required.
  - 2 If applicable, bond the de-ice boot lead wires to the blade in accordance with the De-ice Boot Removal/Installation chapter in this manual.
  - 3 Join two tie straps (910).
  - 4 Install the joined tie straps (910) around the blade to secure the de-ice boot wires to the blade shank in accordance with Figure DM-2.
  - 5 Install two tie straps (930) to secure the tie straps (910) in position in accordance with Figure DM-2.
- (12) Using the screw (220), washers (200 and/or 210) nut (190), attach the terminal strip (170) to the bulkhead in accordance with Figure DM-3 and Figure DM-4.
- (a) Torque the screw (220) to 10-12 In-Lbs (1.1-1.3 N•m).
- (13) Install the slip ring lead wires and de-ice wire harness (890) to the terminal strip (170) in accordance with Figure DM-5.
- (a) Tighten the terminal screws until snug.
- (14) Install the clamp (590) around the wire harness (890) then position the centerline of the clamp (590) parallel to the the terminal strip (170) as shown in Figure DM-6.
- (15) Using the screw (610), washers (620 and/or 630), and nut (600), attach the clamp (590) to the bulkhead in accordance with Figure DM-4 and Figure DM-7.
- (a) Torque the screw (610) to 22-25 In-Lbs (2.48-2.82 N•m).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-870-4**



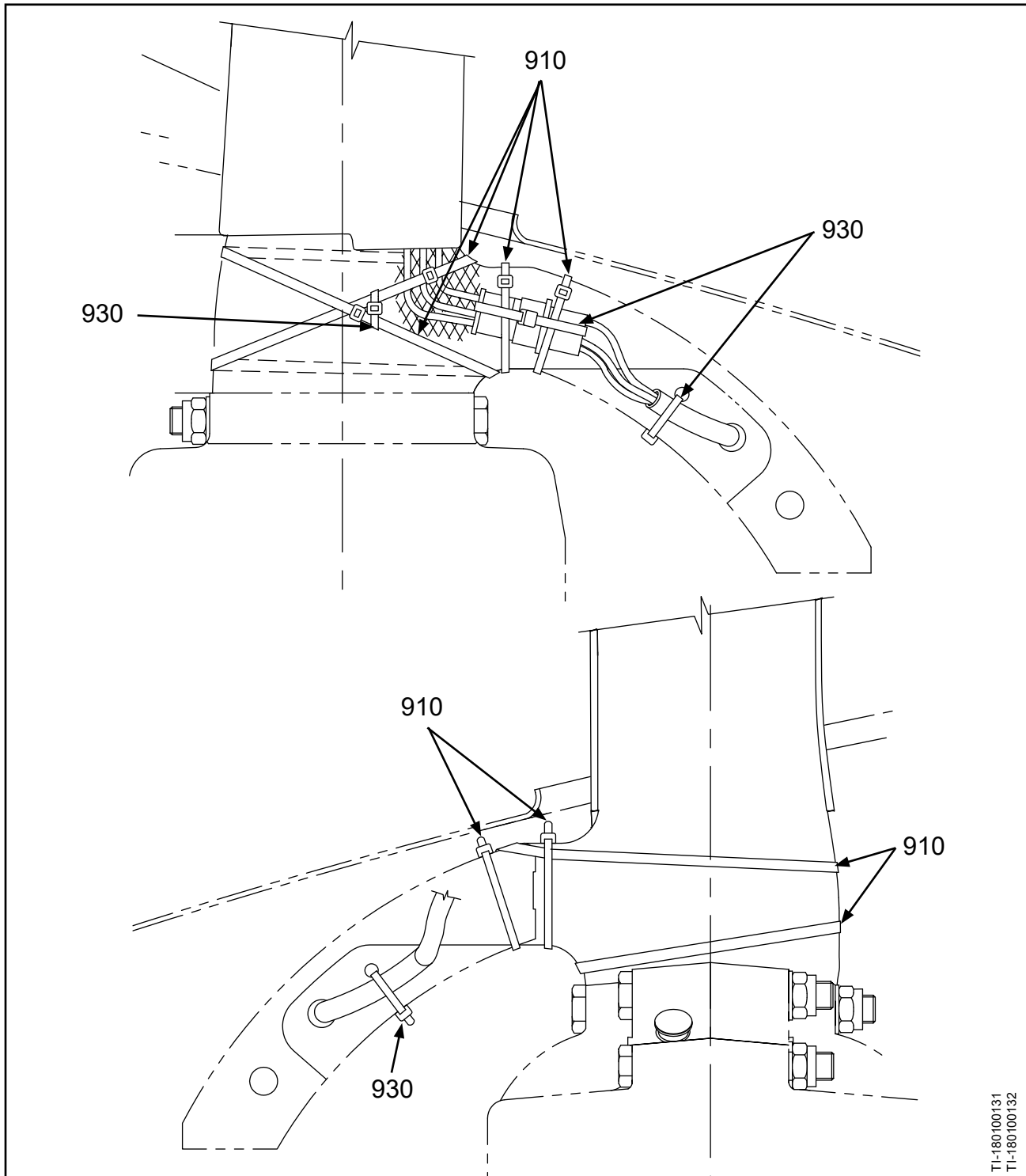
TI-18000131

**Slip Ring Mounting  
Figure DM-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-870-4**



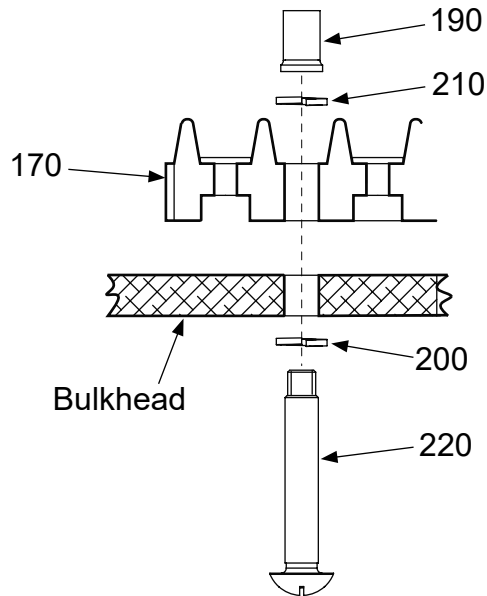
**Wire Harness to Counterweight  
Figure DM-2**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-870-4**



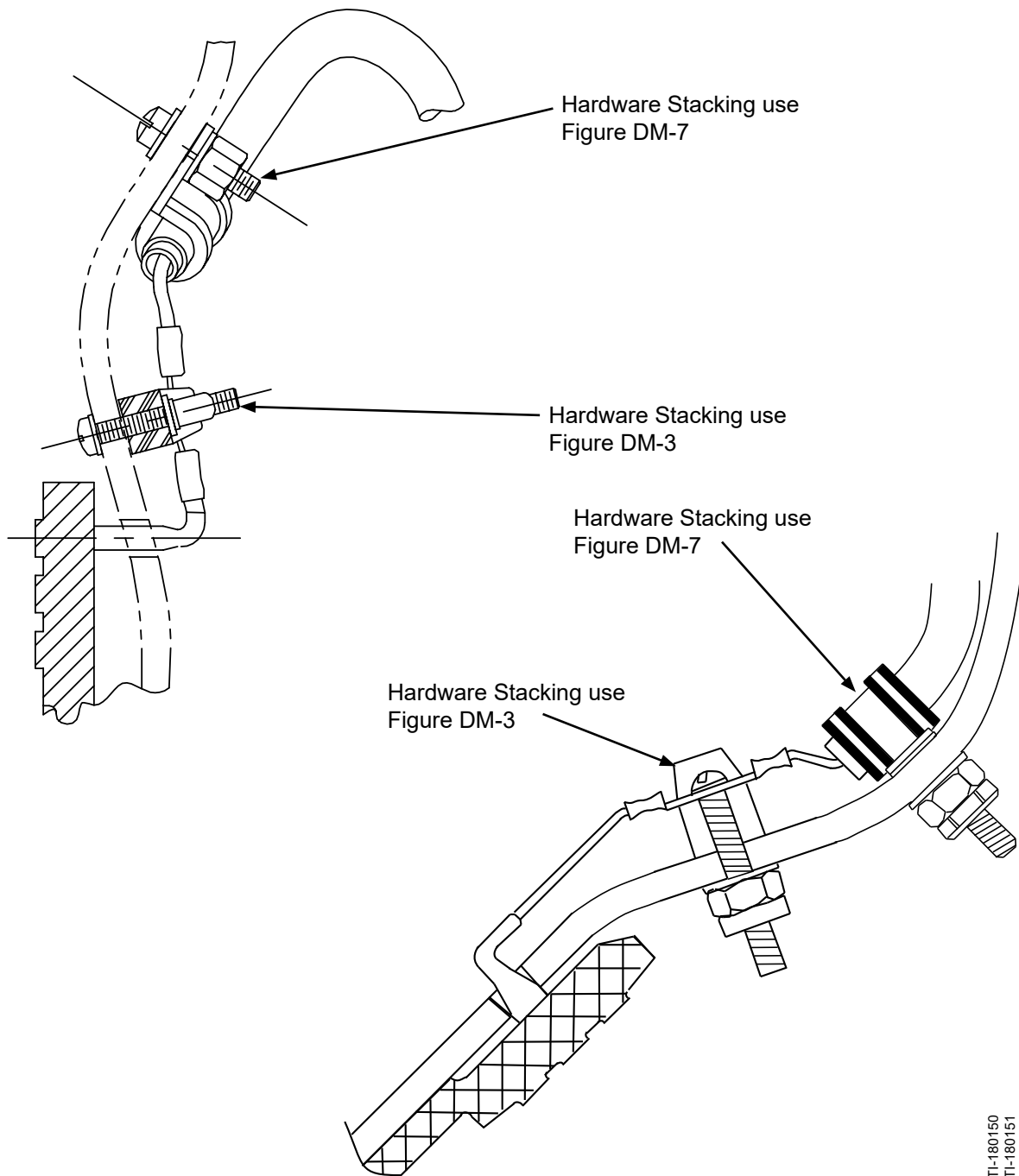
TPI-MB-0136

**Terminal Strip Hardware Configuration: Bulkhead Mounted  
Figure DM-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-870-4**



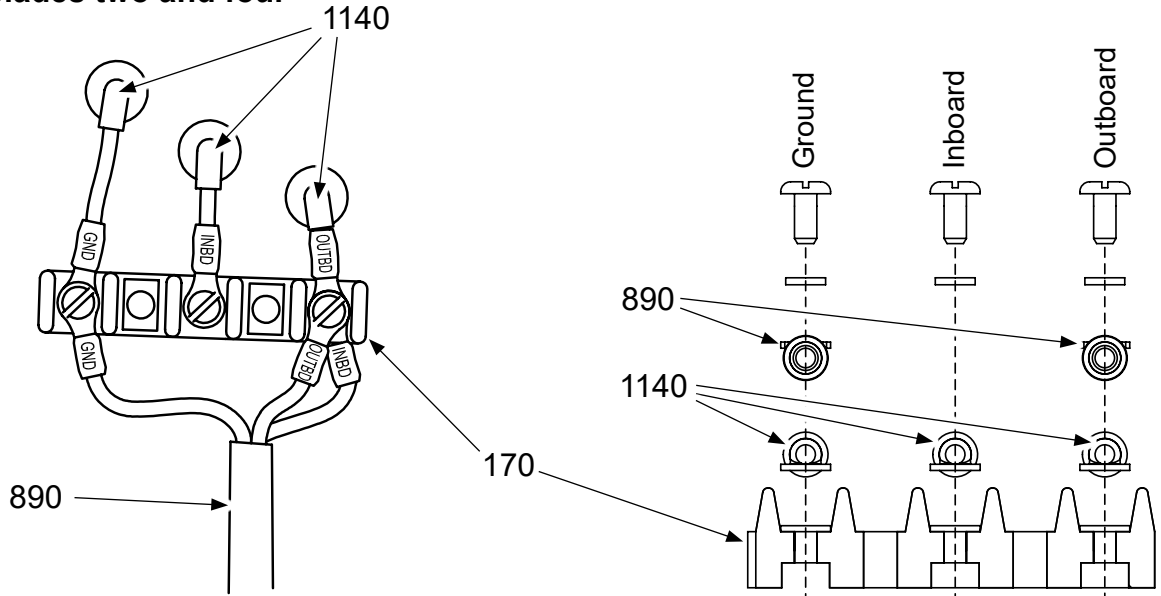
**Terminal Strip and Loop Clamp to Bulkhead Attachment  
Figure DM-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

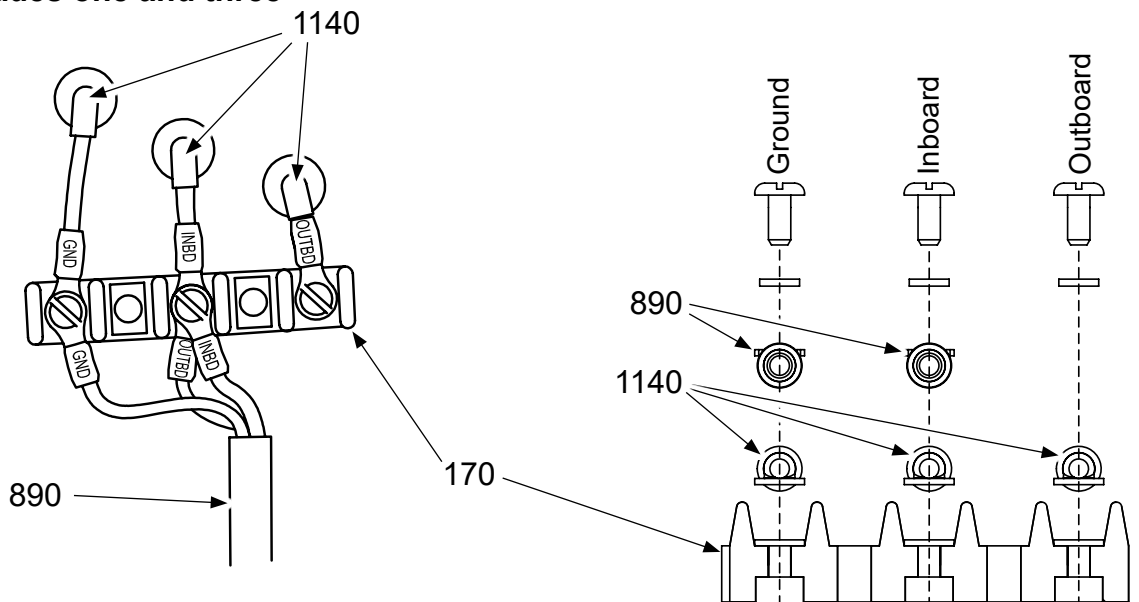
**7931-67-870-4**

**Blades two and four**



**NOTE:** The illustrations show slip ring wires on a typical right-hand (rotation) propeller.

**Blades one and three**



**Crossfire Configuration B**

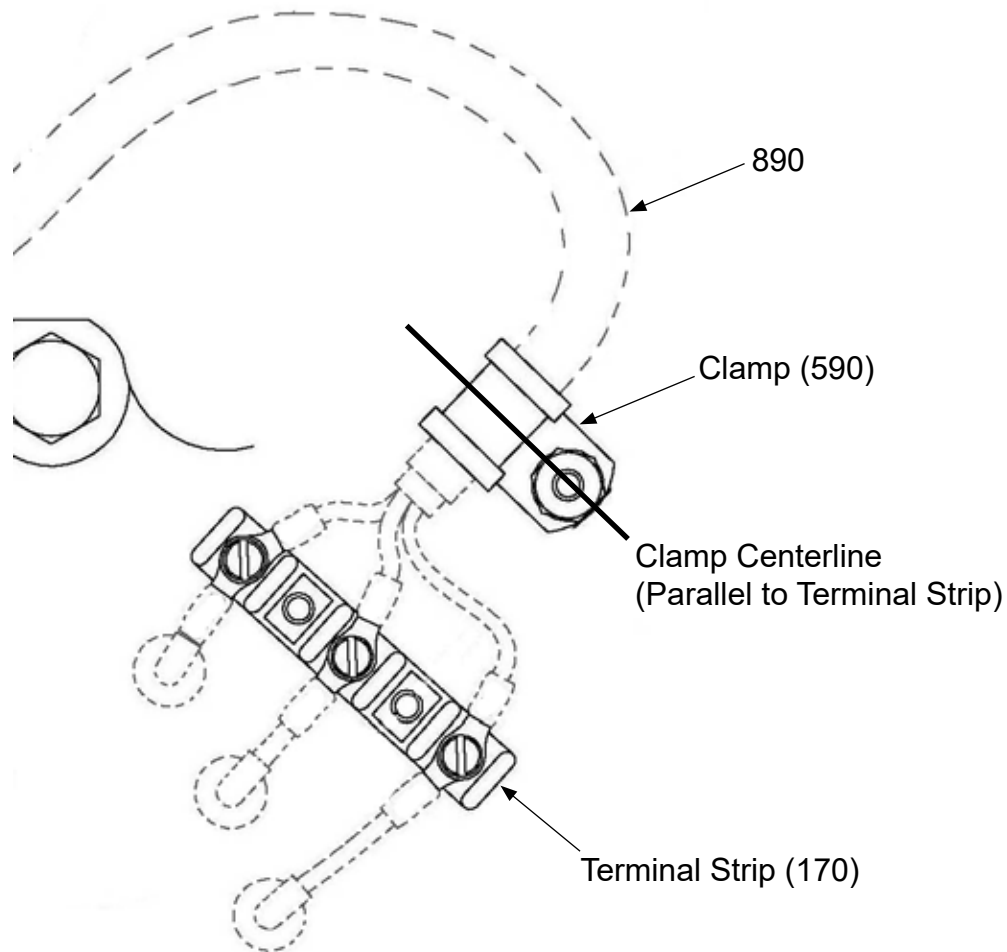
TPI-MB-0131

**Terminal Strip Lead Wire Configurations: Bulkhead Mounted  
Figure DM-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-870-4**



**NOTE:** This figure illustrates the orientation of the clamp to the terminal strip. Wire harness/slip ring wires are shown for reference only. Actual wire harness may have two or three wires.

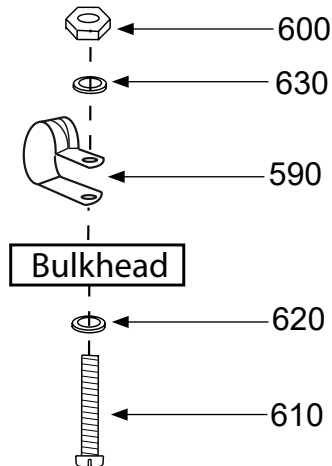
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**Loop Clamp Orientation  
Figure DM-6**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-870-4**



TI-00180AC

**Loop Clamp to Bulkhead Hardware Configuration  
Figure DM-7**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-870-4**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-870-4</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11DM FIGURES: DM-1 thru DM-7</b>		
170	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY ITEM 170A	4	
170A	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES ITEM 170	4	
190	7931-2E1365	• TAPPED EYELET SUPERSEDED BY ITEM 190A	8	Y
190A	2H1365	• TAPPED EYELET SUPERSEDES ITEM 190	8	Y
200	B-3854-41	• WASHER, LOCK	8	Y
210	B-3854-41	• WASHER, LOCK	8	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	8	Y
590	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	4	Y
600	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
610	B-3856-248	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
620	B-3854-42	• WASHER, LOCK	4	Y
630	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
890	7931-4E2369-5	• DE-ICE WIRE HARNESS SUPERSEDED BY ITEM 890A	4	Y
890A	4H2369-5	• DE-ICE WIRE HARNESS SUPERSEDES ITEM 890	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	16	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	12	Y
1140	7931-4E2661-4	• SLIP RING ASSEMBLY SUPERSEDED BY ITEM 1140A	1	
1140A	4H2661-4	• SLIP RING ASSEMBLY SUPERSEDES ITEM 1140	1	
1160	B-3384-9H	• BOLT, 1/4-28, HEX HEAD	8	Y
1210	B-3851-0432	• WASHER	8	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 7931-67-870-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-890-1 and 102282-1**

**DN. Installation Instruction 11DN**

- (1) Using the screws (1170), attach the slip ring (1140) and the bulkhead to the hub as shown in Figure DN-1.
  - (a) Torque each screw (1170) 96-120 In-Lbs (10.1-13.5 N•m).
  - (b) Perform slip ring run-out check in accordance with the Check chapter in this manual.
- (2) Position the propeller blades at reverse blade angle.
- (3) Assemble the plug connection between the wire harness (890) and the de-ice boot.
- (4) Install the tie strap (930) around the wire harness/de-ice boot plug connection.
- (5) Position the tie strap head (930) in approximate location shown in Figure DN-2.
- (6) Route the terminal end of the wire harness (890) through the hole in counterweight rib, as shown in Figure DN-2.
- (7) Secure the wire harness/boot connection to the counterweight.
  - (a) Install tie straps (910) under the tie strap (930) connecting the wire harness/boot plugs, and around the counterweight as shown in Figure DN-2.
  - (b) Position the tie strap head in the approximate location on the side of the counterweight as shown in Figure DN-2. Do not tighten the tie strap (910) at this time.
- (8) Verify that the wire harness (890) is taut through the counterweight hole.
- (9) Secure the wire harness (890) to the counterweight by installing the tie strap (930) through the counterweight hole and around the wire harness (890) on both sides of the counterweight. Position the tie strap head in the approximate location shown in Figure DN-2.
- (10) Tighten all of the tie straps (910 and 930).
- (11) If applicable, bond the de-ice boot lead wires to the blade in accordance with the De-ice Boot Removal/Installation chapter in this manual.

**NOTE:** Some de-ice boots are designed with a bent lead strap. Install the de-ice boot in accordance with the De-ice Boot Removal/Installation chapter in this manual.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-890-1 and 102282-1**

**DN.**    Installation Instruction 11DN - continued

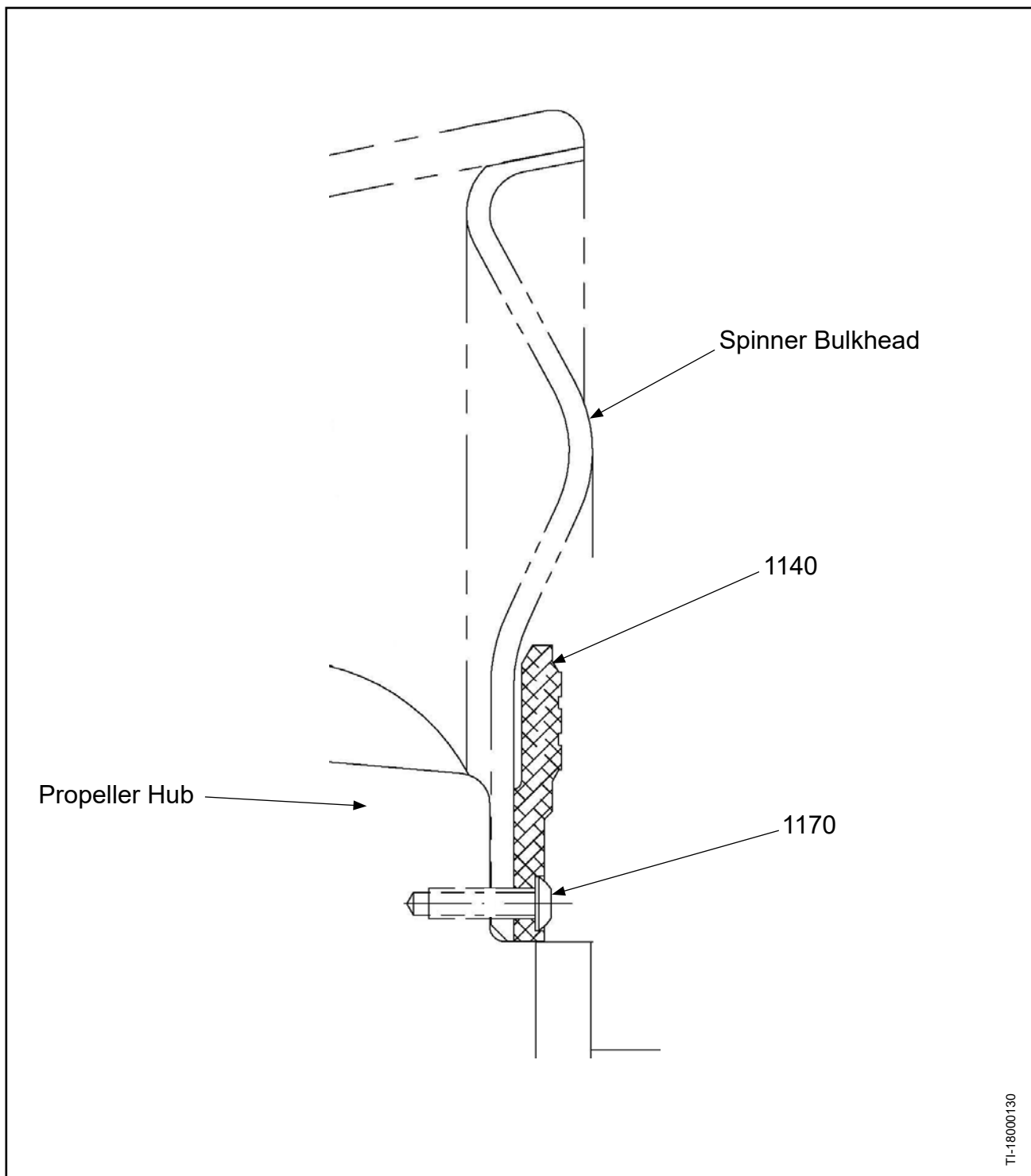
- (12) Position the terminal strip (170) on the bulkhead in accordance with Orientation B in Figure DN-3.
- (13) Using the screw (220), washers (200 and/or 210), and nut (190), attach the terminal strip (170) to the bulkhead in accordance with Figure DN-3, and Figure DN-4.
  - (a) Torque the screw (220) to 10-12 In-Lbs (1.1-1.3 N•m).
- (14) Install the slip ring lead wires and de-ice wire harness (890) to the terminal strip (170) in accordance with Figure DN-5.
- (15) Tighten the terminal screws until snug.
- (16) Install the clamp (590) around the wire harness (890), then position the centerline of the clamp (590) parallel to terminal strip (170) as shown in Figure DN-6.
- (17) Using the screw (610), washers (620 and/or 630), and nut (600), attach the clamp (590) to the bulkhead in accordance with Figure DN-4 and Figure DN-6.
  - (a) Torque the screw (610) to 22-25 In-Lbs (2.48-2.82 N•m).



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

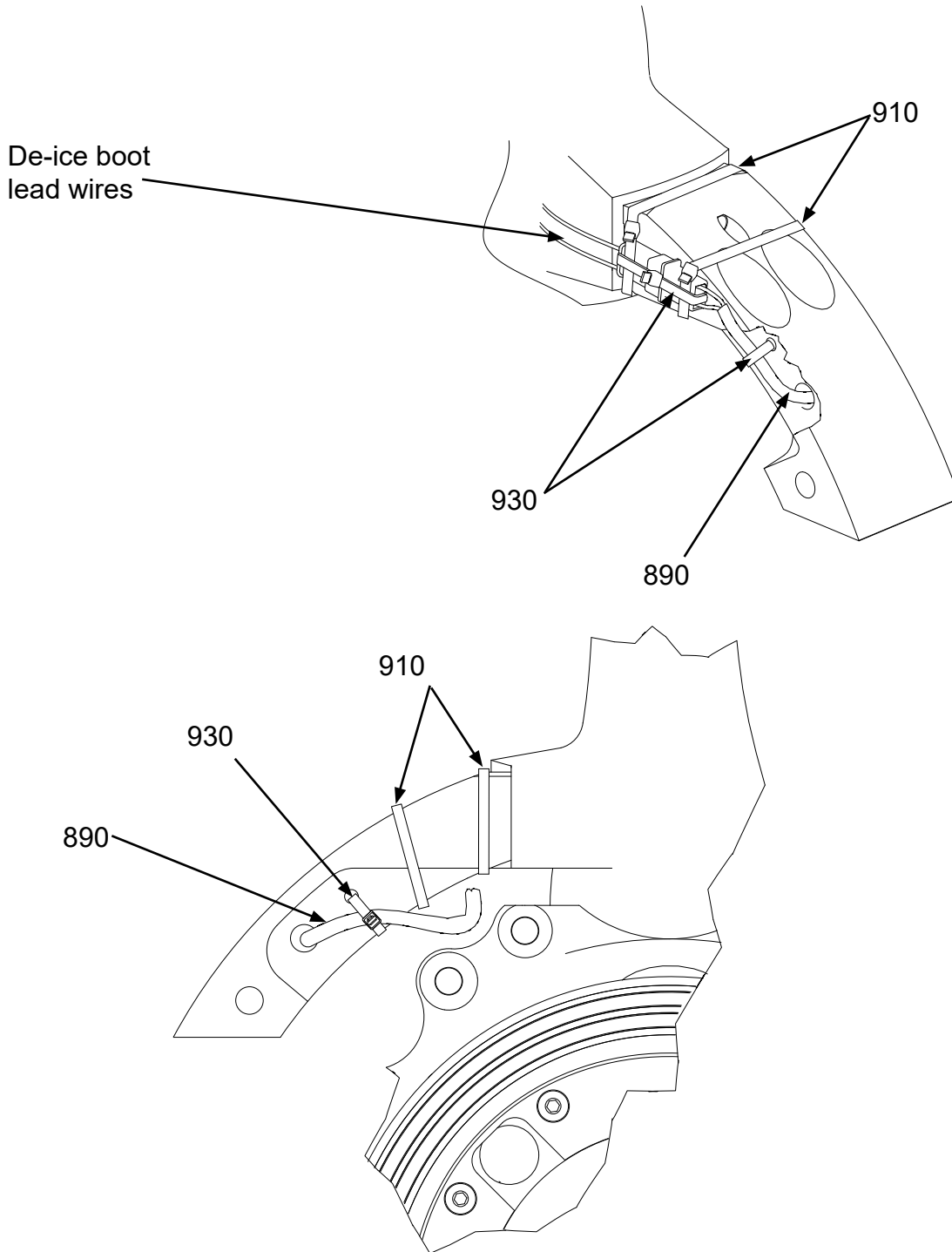
**7931-67-890-1 and 102282-1**



**Slip Ring Mounting  
Figure DN-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-890-1 and 102282-1**

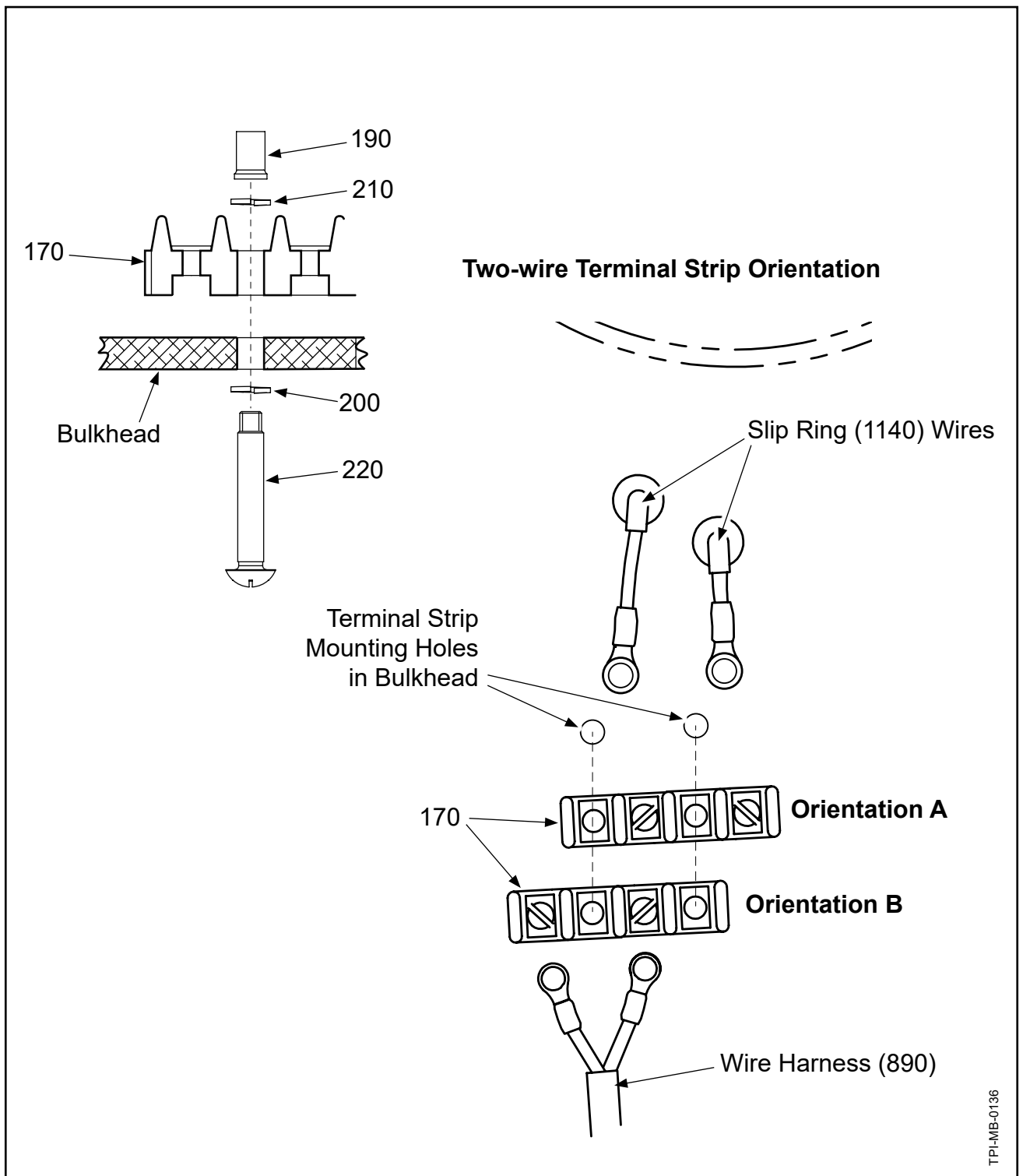


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TI-180100120

**Wire Harness to Counterweight  
Figure DN-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

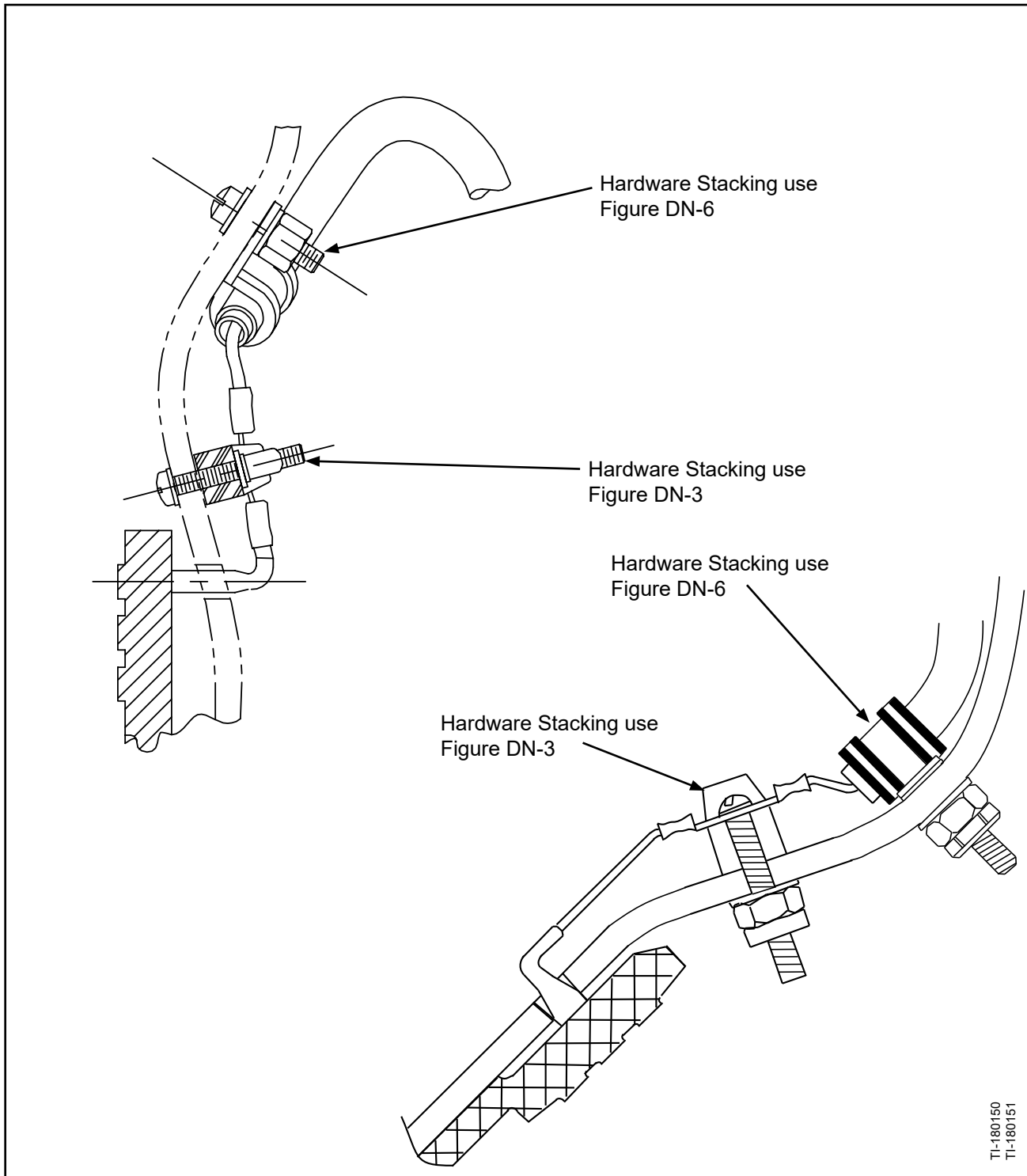
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-890-1 and 102282-1**



**Terminal Strip Hardware Configuration: Bulkhead Mounted  
Figure DN-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-890-1 and 102282-1**

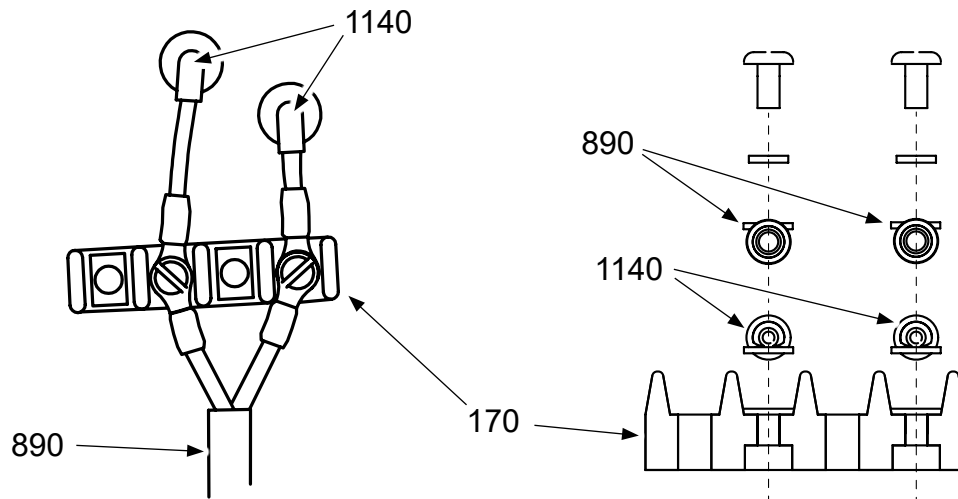


**Terminal Strip and Loop Clamp to Bulkhead Attachment  
Figure DN-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-890-1 and 102282-1**

**Typical Two-wire Configuration**

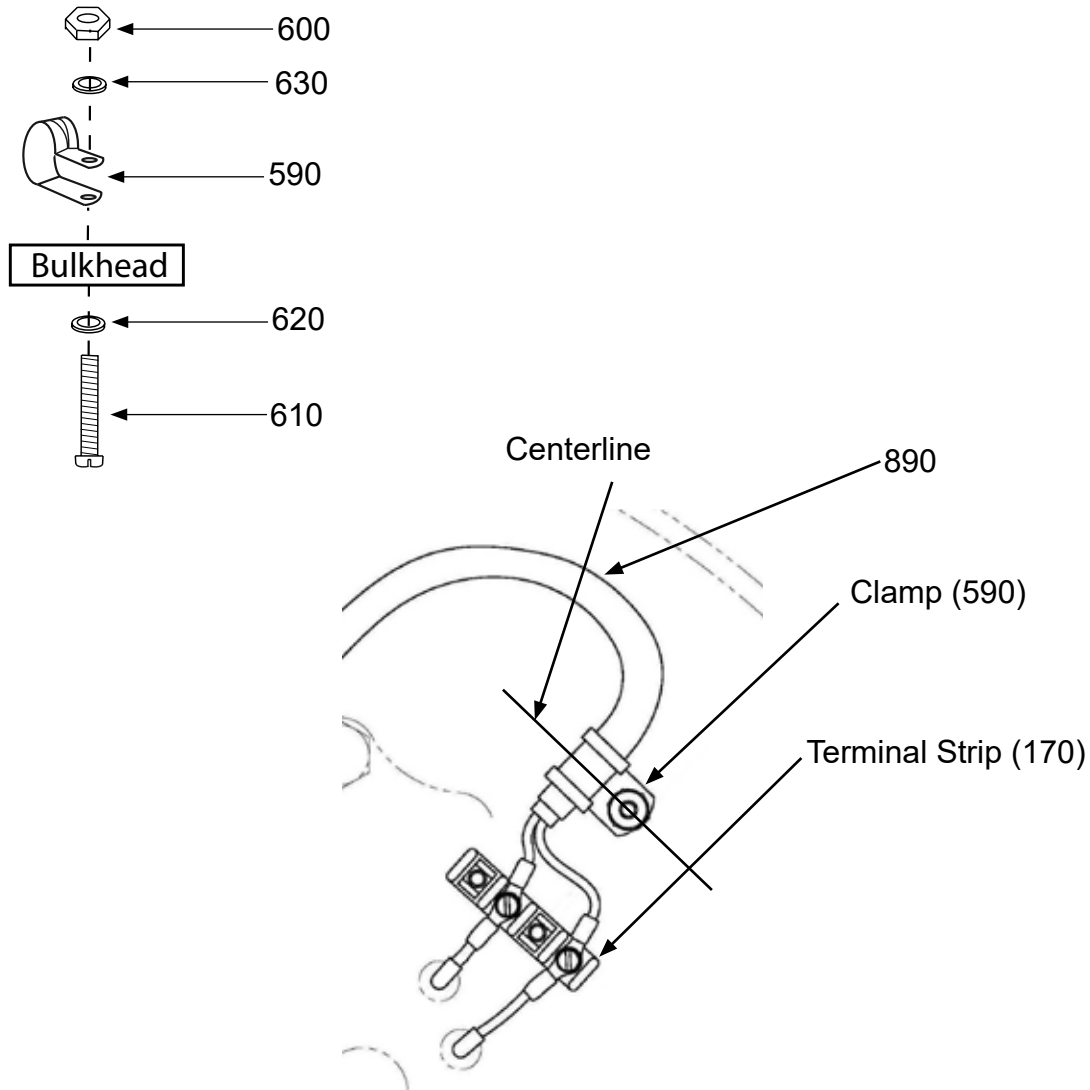


**NOTE:** The illustrations show slip ring wires on a  
typical right-hand (rotation) propeller.

**Terminal Strip Lead Wire Configuration: Bulkhead Mounted  
Figure DN-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-890-1 and 102282-1**



Position the clamp (590) with the terminal strip (170) as shown.

TI-180142

**Loop Clamp Hardware Configuration  
Figure DN-6**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-890-1 and 102282-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-890-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) SUPERSEDED BY 106298, POST HC-SB-30-366 INSTALLATION INSTRUCTION 11DN FIGURES: DN-1 thru DN-6</b>		
170	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES ITEM 170A	4	
170A	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY ITEM 170	4	
190	2H1365	• TAPPED EYELET SUPERSEDES ITEM 190A	8	Y
190A	7931-2E1365	• TAPPED EYELET SUPERSEDED BY ITEM 190	8	Y
200	B-3854-41	• WASHER, LOCK	8	Y
210	B-3854-41	• WASHER, LOCK	8	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	8	Y
590	B-6735	• CLAMP, LOOP, CUSHIONED	4	Y
600	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
610	B-3856-248	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
620	B-3854-42	• WASHER, LOCK	4	Y
630	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
890	3H2092-4	• WIRE HARNESS SUPERSEDES ITEM 890A	4	Y
890A	7931-3E2092-4	• WIRE HARNESS SUPERSEDED BY ITEM 890	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	8	Y
1140	7931-4E2674-2	• SLIP RING ASSEMBLY SUPERSEDED BY ITEM 1140A	1	
1140A	4H2674-2	• SLIP RING ASSEMBLY SUPERSEDES ITEM 1140	1	
1170	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	8	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 7931-67-890-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-890-1 and 102282-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>102282-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>SUPERSEDED BY 106298, POST HC-SB-30-366</b> <b>INSTALLATION INSTRUCTION 11DN</b> <b>FIGURES: DN-1 thru DN-6</b>		
170	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM	4	
190	2H1365	• TAPPED EYELET	8	Y
200	B-3854-41	• WASHER, LOCK	8	Y
210	B-3854-41	• WASHER, LOCK	8	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	8	Y
590	B-6735	• CLAMP, LOOP, CUSHIONED	4	Y
600	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
610	B-3856-248	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
620	B-3854-42	• WASHER, LOCK	4	Y
630	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
890	3H2092-4	• WIRE HARNESS	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	8	Y
1140	4H2674-2	• SLIP RING ASSEMBLY	1	
1170	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	8	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 102282-1**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-925-1**

**DO. Installation Instruction 11DO**

- (1) Using the screws (1170), attach the slip ring (1140) and the bulkhead to the hub as shown in Figure DO-1.
  - (a) Torque each screw (1170) 96-120 In-Lbs (10.1-13.5 N•m).
  - (b) Perform slip ring run-out check in accordance with the Check chapter in this manual.
- (2) Position the propeller blades at reverse blade angle.
- (3) Assemble the plug connection between the wire harness (890) and the de-ice boot.
- (4) Install and tighten the tie strap (900) around the wire harness/de-ice boot plug connection in accordance with Figure DO-2.
- (5) Position the tie strap head (900) in approximate location shown in Figure DO-2.
- (6) Route the terminal end of the wire harness (890) through the hole in counterweight rib, as shown in Figure DO-2.
- (7) Install the clamp (660) on the wire harness (890) and attach to the counterweight in accordance with Figure DO-2 and Figure DO-4.
- (8) Verify that the wire harness (890) is taut through the counterweight hole.
- (9) Secure the wire harness/boot connection to the counterweight.
  - (a) Using screw (805) and washer (815), attach the tie mount (810) to the counterweight in accordance with Figure DO-3.
  - (b) Install tie straps (910) under the tie strap (900) connecting the wire harness/boot plugs, and around the counterweight as shown in Figure DO-2 and Figure DO-3.
  - (c) Route the inboard tie strap (910) through the tie mount (810) as shown in Figure DO-3.
  - (d) Position the tie strap head in the approximate location shown in Figure DO-2. Do not tighten the tie strap (910) at this time.
- (10) Tighten all of the tie straps (900 and 910).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-925-1**

**DO.**    Installation Instruction 11DO - continued

- (11) Secure the de-ice boot lead wires to the blade. Use instruction(11)(a) or (11)(b).

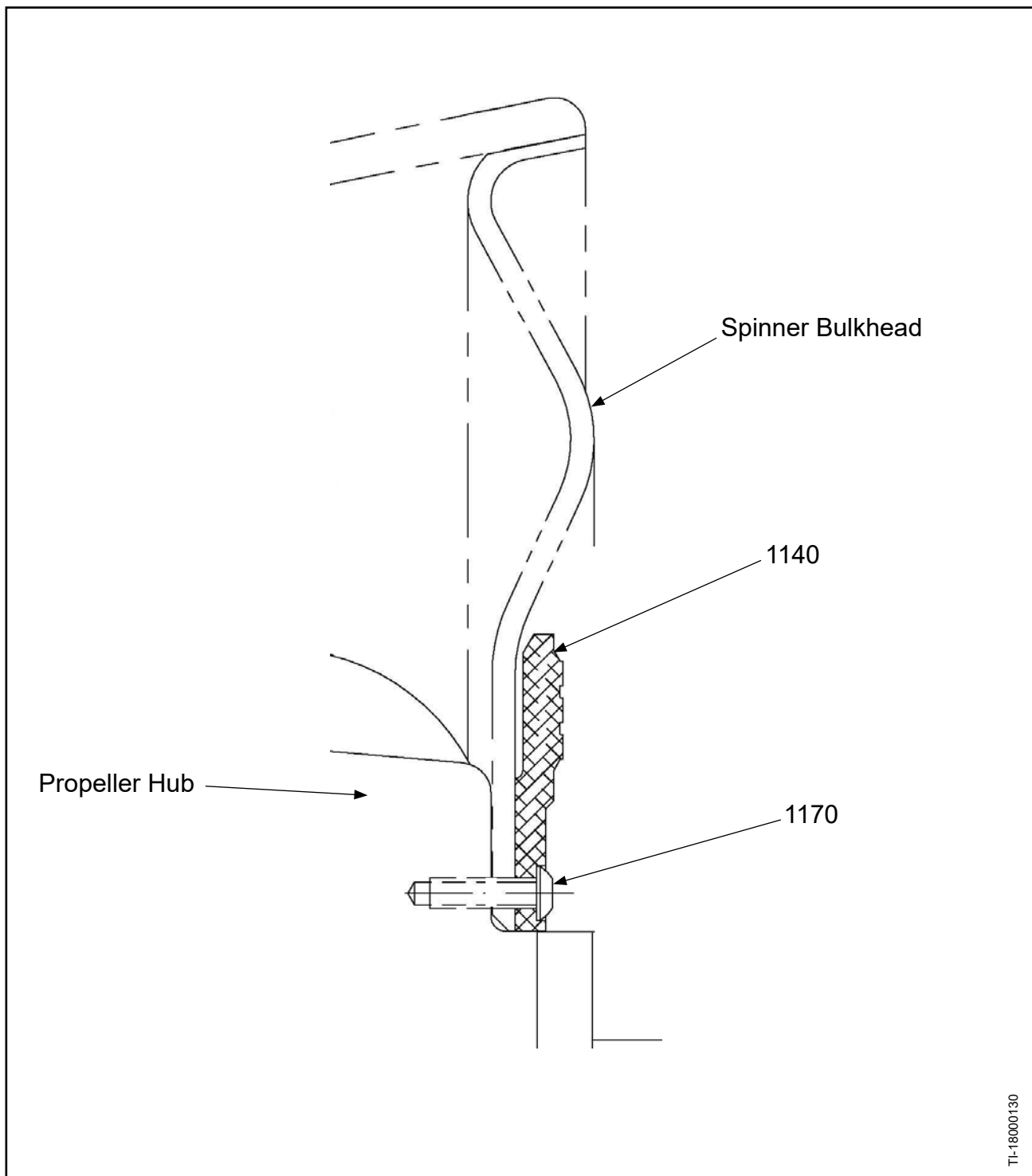
**NOTE:**    Some de-ice boots are designed with a bent lead strap. Install the de-ice boot in accordance with the De-ice Boot Removal/Installation chapter in this manual.

- (a) If applicable, bond the de-ice boot wires to the blade in accordance with the De-ice Boot Removal/Installation chapter in this manual. Installation of tie straps (900) and (910) to secure the de-ice boot wires to the blade shank is not required.
- (b) Using tie straps (900) and (910):
- 1    If the de-ice boot has a bent lead strap, installation of tie straps (910) to secure the de-ice boot wires to the blade shank is not required.
  - 2    If applicable, bond the de-ice boot lead wires to the blade in accordance with the De-ice Boot Removal/Installation chapter in this manual.
  - 3    Join two tie straps (910).
  - 4    Install the joined tie straps (910) around the blade to secure the de-ice boot wires to the blade shank in accordance with Figure DO-2 and Figure DO-3.
- (12) Position the terminal strip (170) on the bulkhead in accordance with Orientation A shown in Figure DO-5.
- (13) Using the screw (220), washers (200 and/or 210), and nut (190), attach the terminal strip (170) to the bulkhead in accordance with Figure DO-5, and Figure DO-6.
- (a) Torque the screw (220) to 10-12 In-Lbs (1.1-1.3 N•m).
- (14) Install the slip ring lead wires and de-ice wire harness (890) to the terminal strip (170) in accordance with Figure DO-7.
- (a) Tighten the terminal screws until snug.
- (15) Install the clamp (590), around the wire harness (890).
- (16) Using the screw (610), washers (620 and/or 630), and nut (600), attach the clamp (590) to the bulkhead in accordance with Figure DO-8.
- (a) Torque the screw (610) to 22-25 In-Lbs (2.48-2.82 N•m).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-925-1**



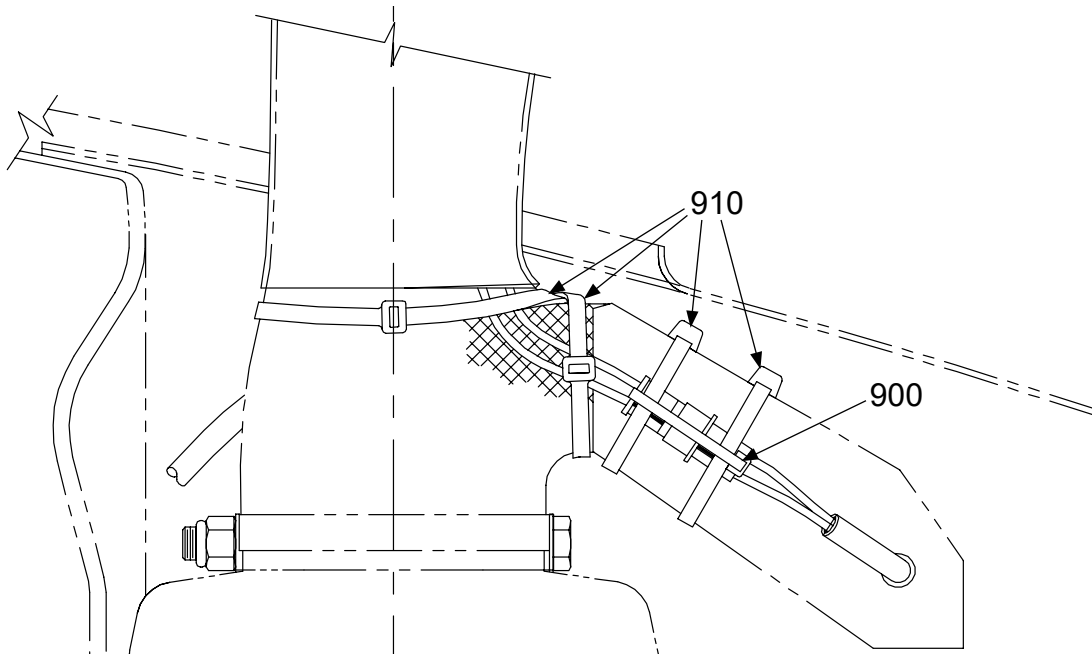
**Slip Ring Mounting  
Figure DO-1**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

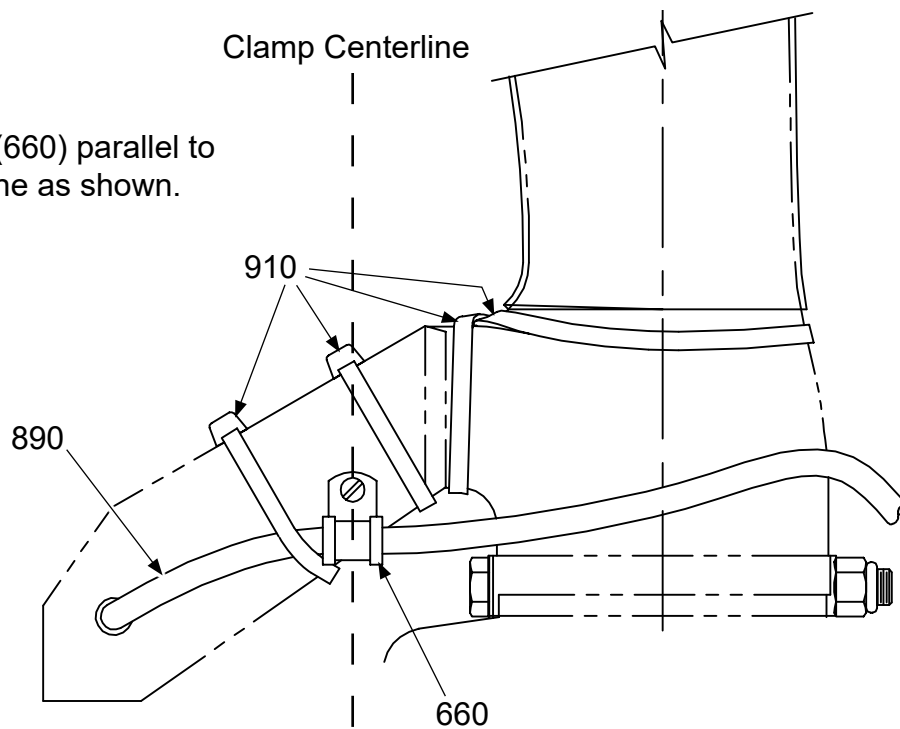
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-925-1**



Blade Centerline

Orient the clamp (660) parallel to  
the blade centerline as shown.



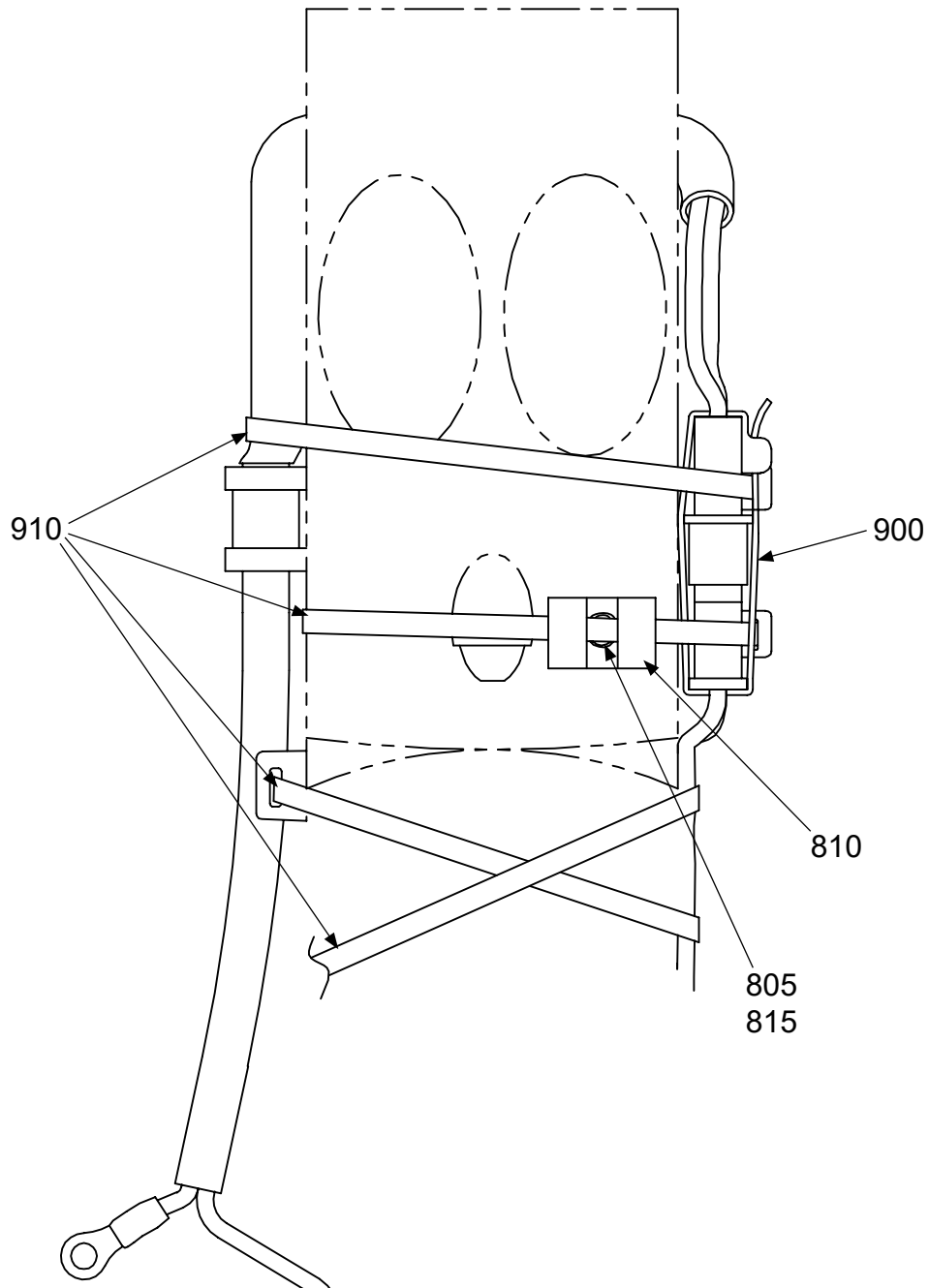
**Wire Harness to Counterweight  
Figure DO-2**

TI-180100113  
TI-180100119

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-925-1**

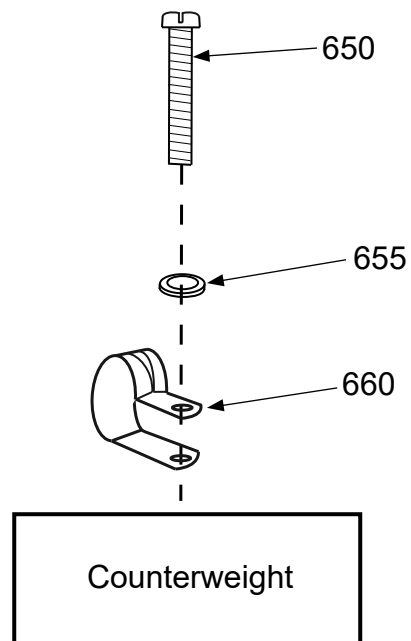


**Wire Harness to Counterweight  
Figure DO-3**

TI-180100114

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-925-1**

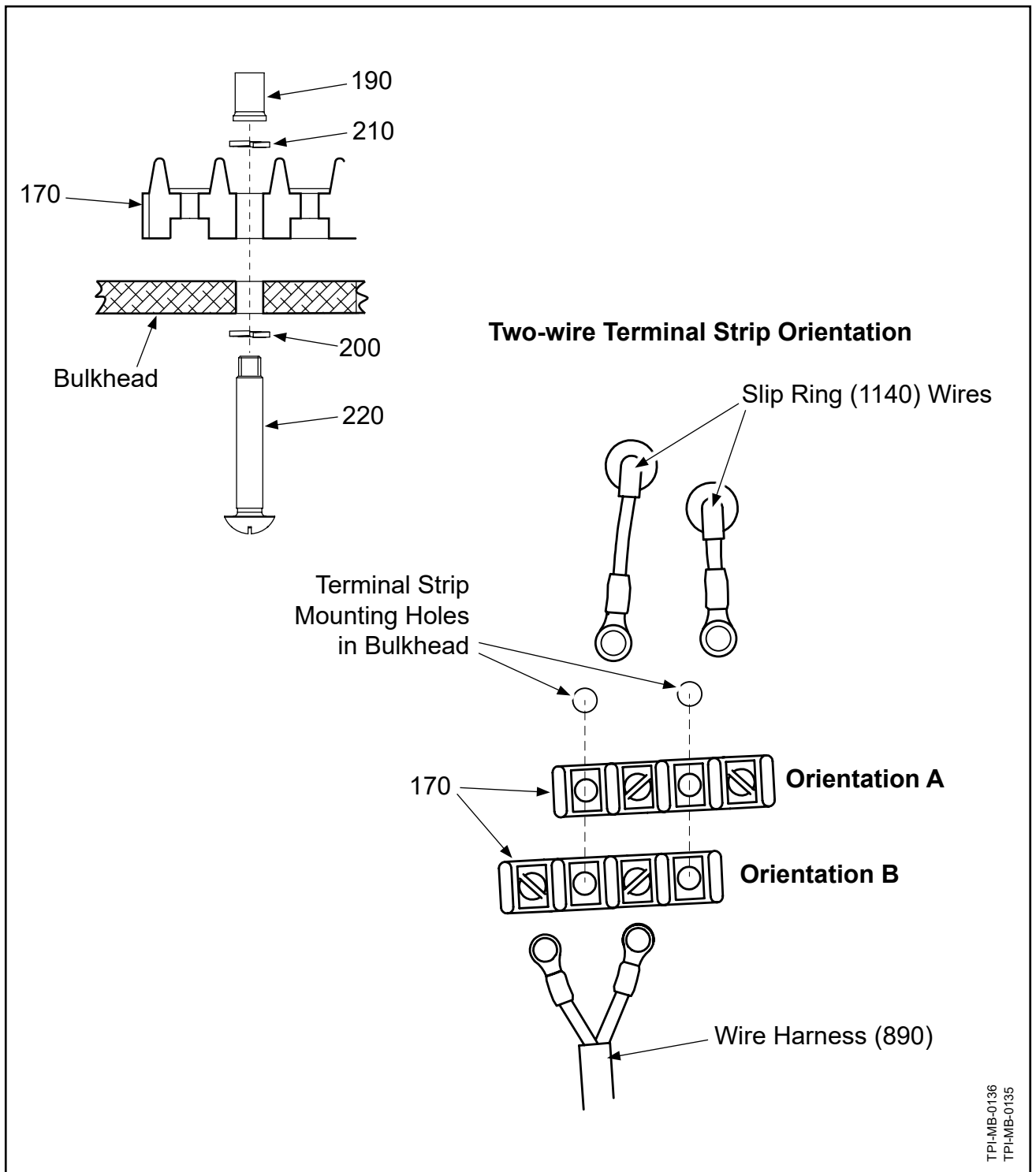


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**Loop Clamp to Counterweight Hardware Configuration  
Figure DO-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

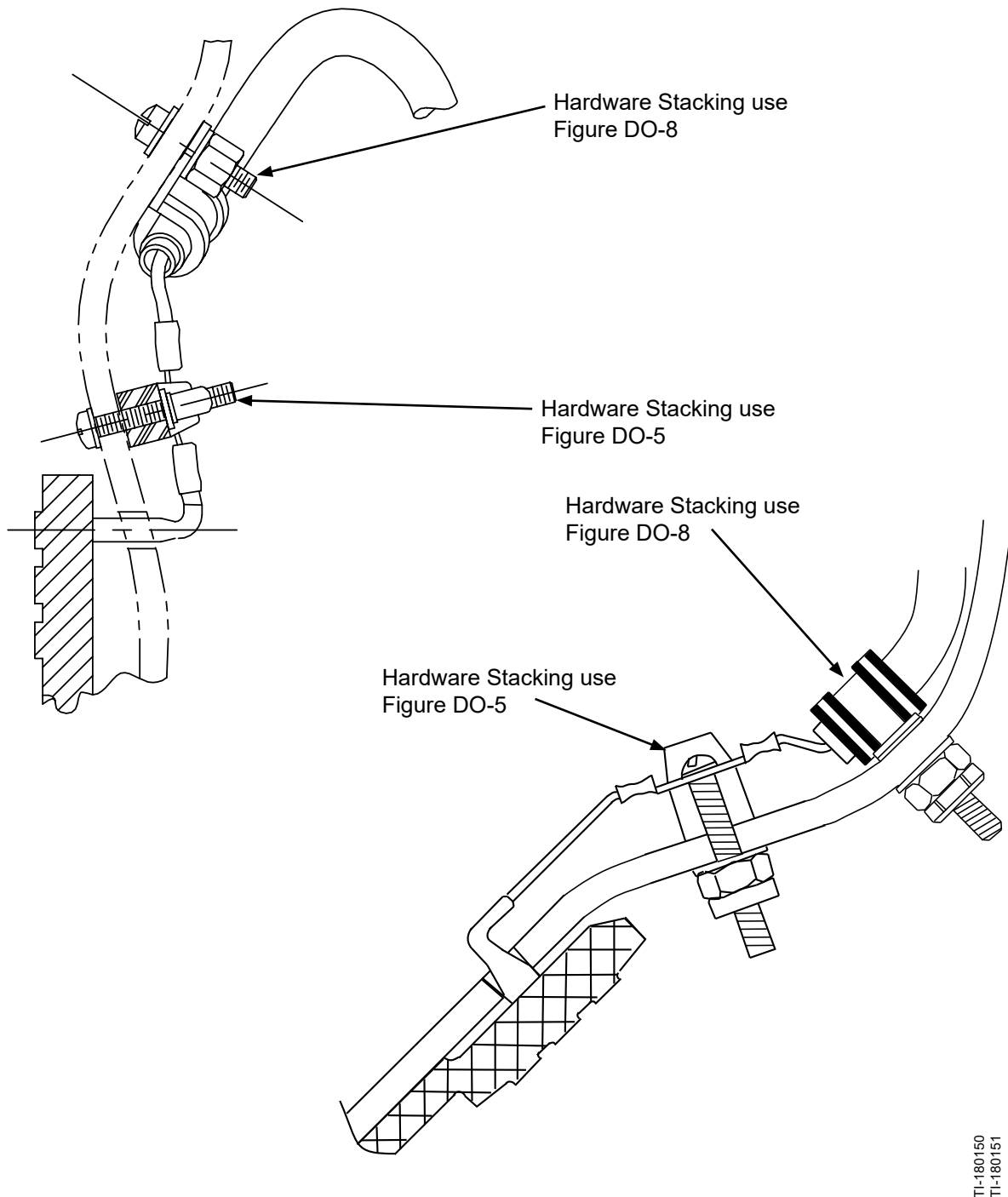
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-925-1**



**Terminal Strip Hardware Configuration: Bulkhead Mounted  
Figure DO-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-925-1**



**Terminal Strip and Loop Clamp to Bulkhead Attachment  
Figure DO-6**

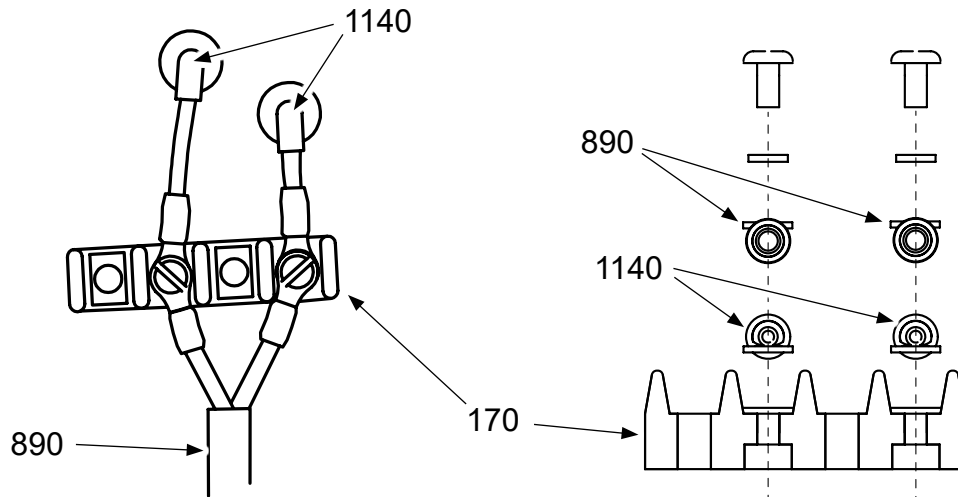


**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-925-1**

**Typical Two-wire Configuration**



**NOTE:** The illustrations show slip ring wires on a  
typical right-hand (rotation) propeller.

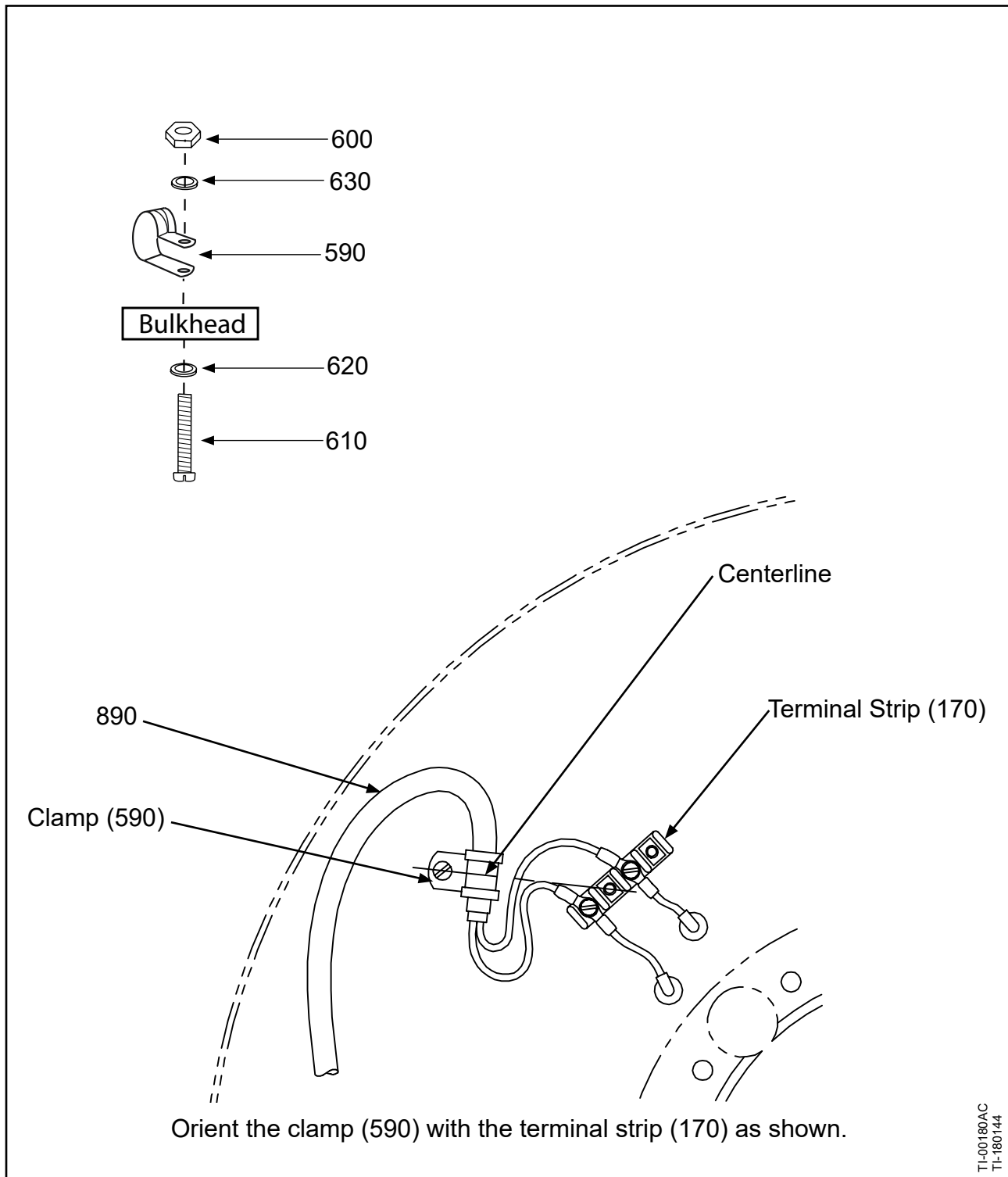
**Terminal Strip Lead Wire Configuration: Bulkhead Mounted  
Figure DO-7**

TP1-MB-0129

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-925-1**



**Loop Clamp to Bulkhead  
Figure DO-8**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-925-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-925-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11DO FIGURES: DO-1 thru DO-8</b>		
170	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY ITEM 170A	4	
170A	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES ITEM 170	4	
190	7931-2E1365	• TAPPED EYELET SUPERSEDED BY ITEM 190A	8	Y
190A	2H1365	• TAPPED EYELET SUPERSEDES ITEM 190	8	Y
200	B-3854-41	• WASHER, LOCK	8	Y
210	B-3854-41	• WASHER, LOCK	8	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	8	Y
590	B-6735	• CLAMP, LOOP, CUSHIONED	4	Y
600	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
610	B-3856-247	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
620	B-3854-42	• WASHER, LOCK	4	Y
630	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
650	B-3856-243	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
655	B-3854-42	• WASHER, LOCK	4	Y
660	B-6735	• CLAMP, LOOP, CUSHIONED	4	Y
805	B-3856-243	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
810	7931-TM2S8(BLK)	• TM2S8-C-0 BLACK TIE MOUNT	4	
815	B-3854-42	• WASHER, LOCK	4	Y
890	7931-3E2360-2	• WIRE HARNESS SUPERSEDED BY 890A	4	Y
890A	7931-3E2360-4	• WIRE HARNESS SUPERSEDED BY ITEM 890B	4	Y
890B	3H2360-4	• WIRE HARNESS SUPERSEDES ITEM 890 AND 890A	4	Y
900	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	16	Y
1140	7931-4E3008-1	• SLIP RING ASSEMBLY SUPERSEDED BY ITEM 1140A	1	
1140A	4H3008-1	• SLIP RING ASSEMBLY SUPERSEDES ITEM 1140	1	
1170	A-2070-10	• SCREW, 1/4-28, BUTTON HEAD	8	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 7931-67-925-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-925-1**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-944-1**

**DP.    Installation Instruction 11DP**

- (1) Using the bolts (1160) and washers (1210), attach the slip ring (1140), aircraft manufacturer's pulley set, and bulkhead to the hub as shown in Figure DP-1.
  - (a) Using CM118, A-6741-118, torque each bolt (1160) to 36-44 In-Lbs (4.1-4.9 N•m).
  - (b) Perform slip ring run-out check in accordance with the Check chapter in this manual.
- (2) Position the propeller blades at reverse blade angle.
- (3) Assemble the plug connection between the wire harness (890) and the de-ice boot.
- (4) Install the tie strap (930) around the wire harness/de-ice boot plug connection.
- (5) Position the tie strap head (930) in approximate location shown in Figure DP-2.
- (6) Route the wire harness (890) through the hole in the counterweight rib.
- (7) Install the clamp (660) on the wire harness (890) and attach to the counterweight in accordance with Figure DP-2 and Figure DP-3.
- (8) Secure the wire harness/boot connection to the counterweight.
  - (a) Install two tie straps (910) under the tie strap (930) connecting the wire harness/boot plugs, and around the counterweight as shown in Figure DP-2. The outboard tie strap is installed over the wire harness on the both sides of the counterweight.
  - (b) Position the tie strap heads in the approximate location on the side of the counterweight as shown in Figure DP-2. Do not tighten the tie strap (910) at this time.
- (9) Remove all slack from the wire harness and secure the wire harness (890) to the counterweight by installing one tie strap (910) around the wire harness (890) as shown in Figure DP-2.
  - (a) Position the tie strap head in the approximate location shown in Figure DP-2.
- (10) Tighten all of the tie straps (910 and 930).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-944-1**

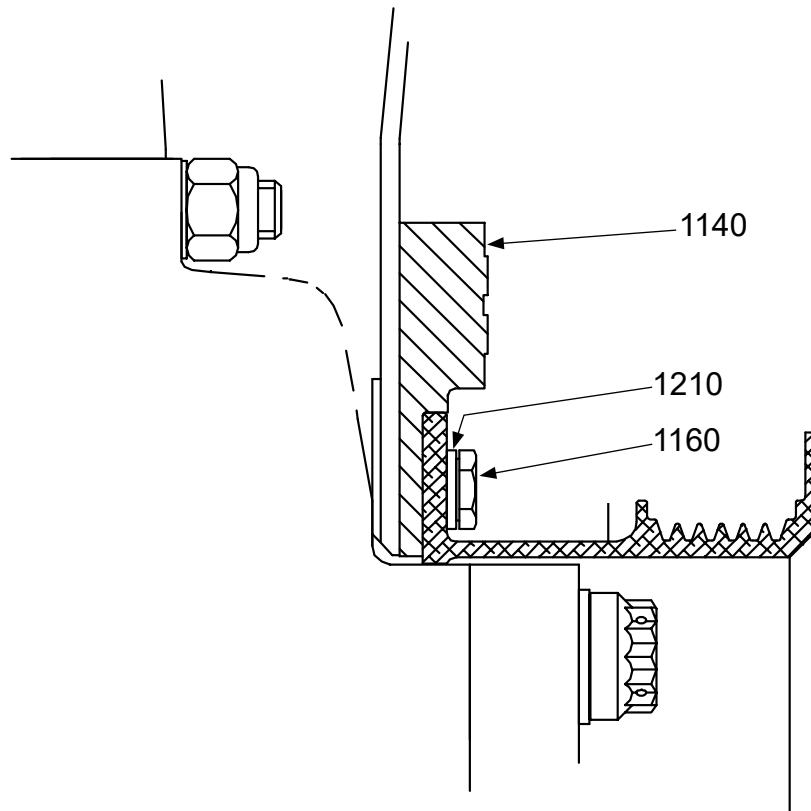
**DP. Installation Instruction 11DP**

- (11) Position the terminal strip (170) on the bulkhead in accordance with Orientation A in Figure DP-4.
- (11) Using the screw (220), washers (200 and 210), and nut (190), attach the terminal strip (170) to the bulkhead in accordance with Figure DP-4 and Figure DP-5.
- (12) Torque the screw (220) to 10-12 In-Lbs (1.1-1.3 N•m).
- (13) Install the slip ring lead wires and de-ice wire harness (890) to the terminal strip (170) in accordance with Figure DP-6.
- (14) Tighten the terminal screws until snug.
- (15) Install the clamp (590) around the wire harness (890), then orient the centerline of the clamp (590) perpendicular to terminal strip (170) as shown in Figure DP-7.
- (16) Using the screw (610), washers (620 and/or 630), and nut (600), attach the clamp (590) to the bulkhead in accordance with Figure DP-7 and Figure DP-8.
- (17) Torque the screw (610) to 22-25 In-Lbs (2.48-2.82 N•m).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-944-1**



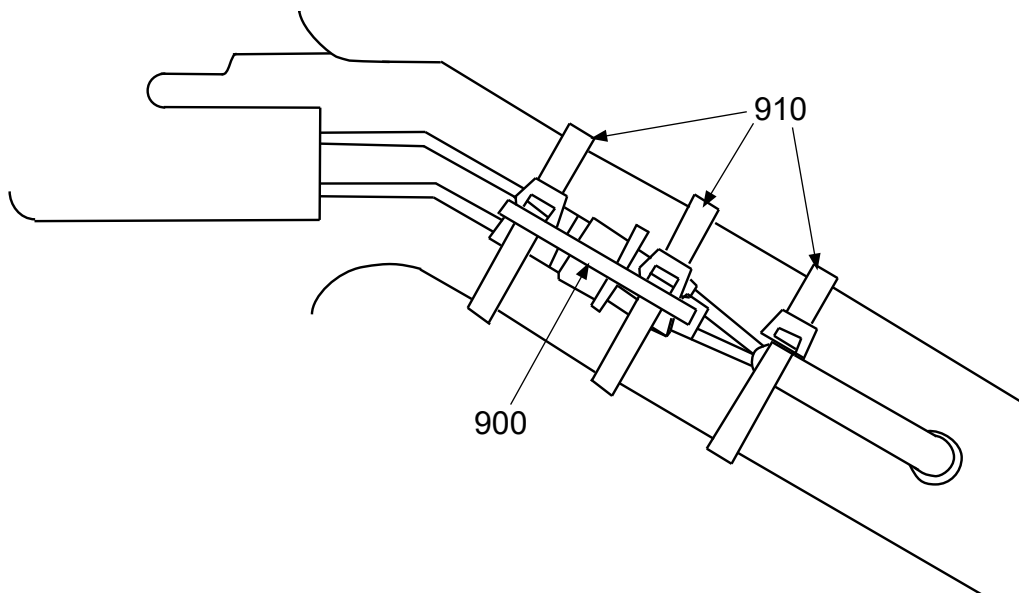
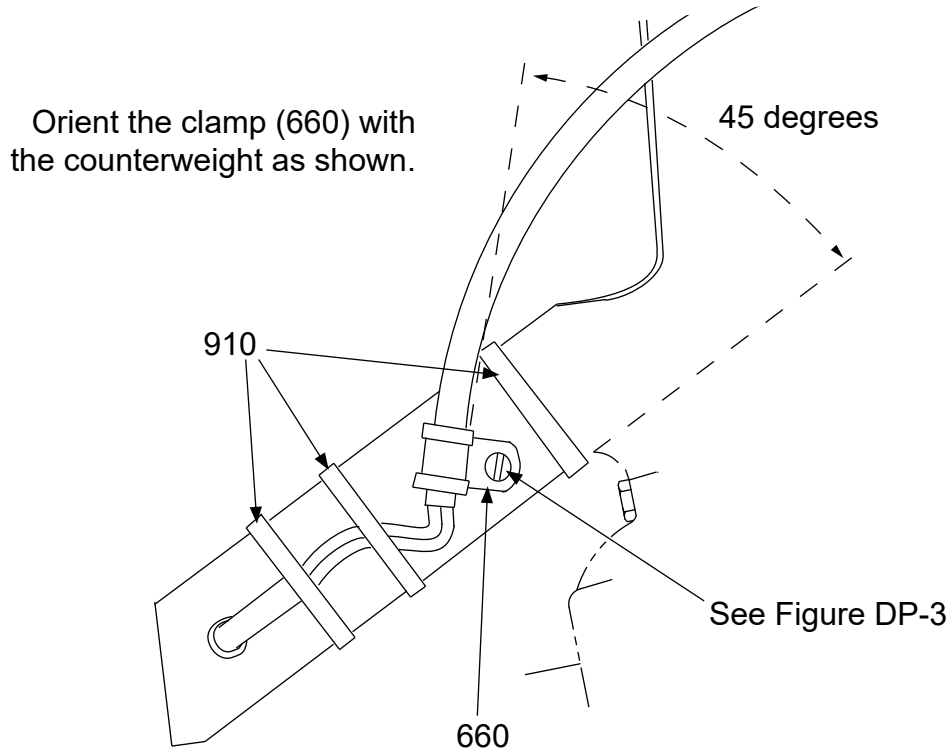
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**Slip Ring Mounting  
Figure DP-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-944-1**



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TI-180100116

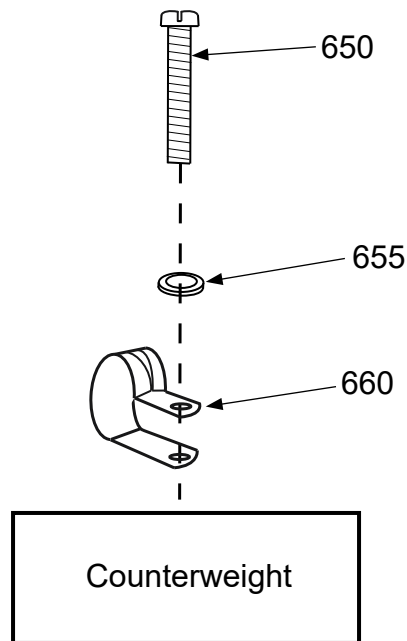
**Wire Harness to Counterweight  
Figure DP-2**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-944-1**



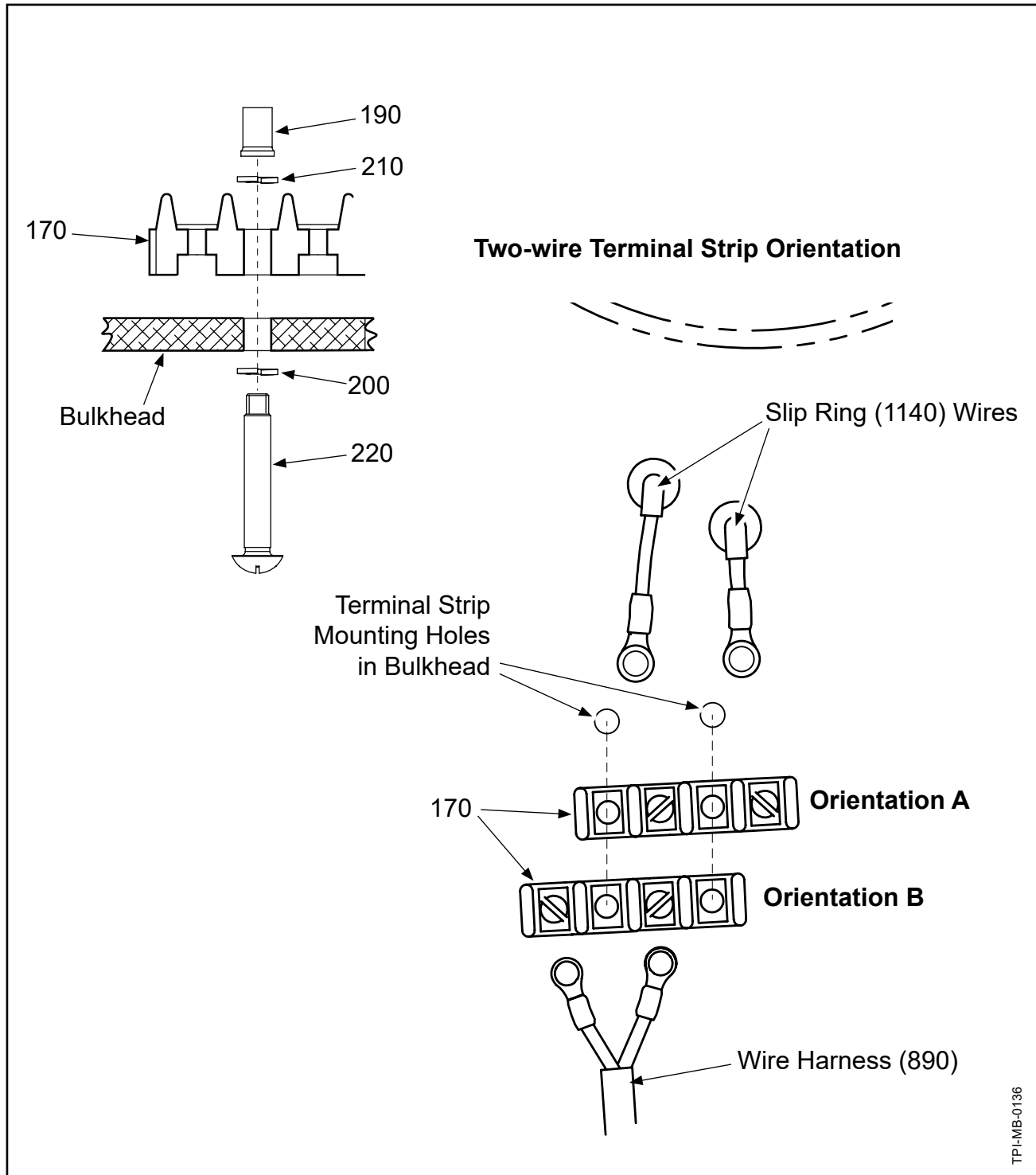
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**Loop Clamp to Counterweight Hardware Configurations  
Figure DP-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-944-1**

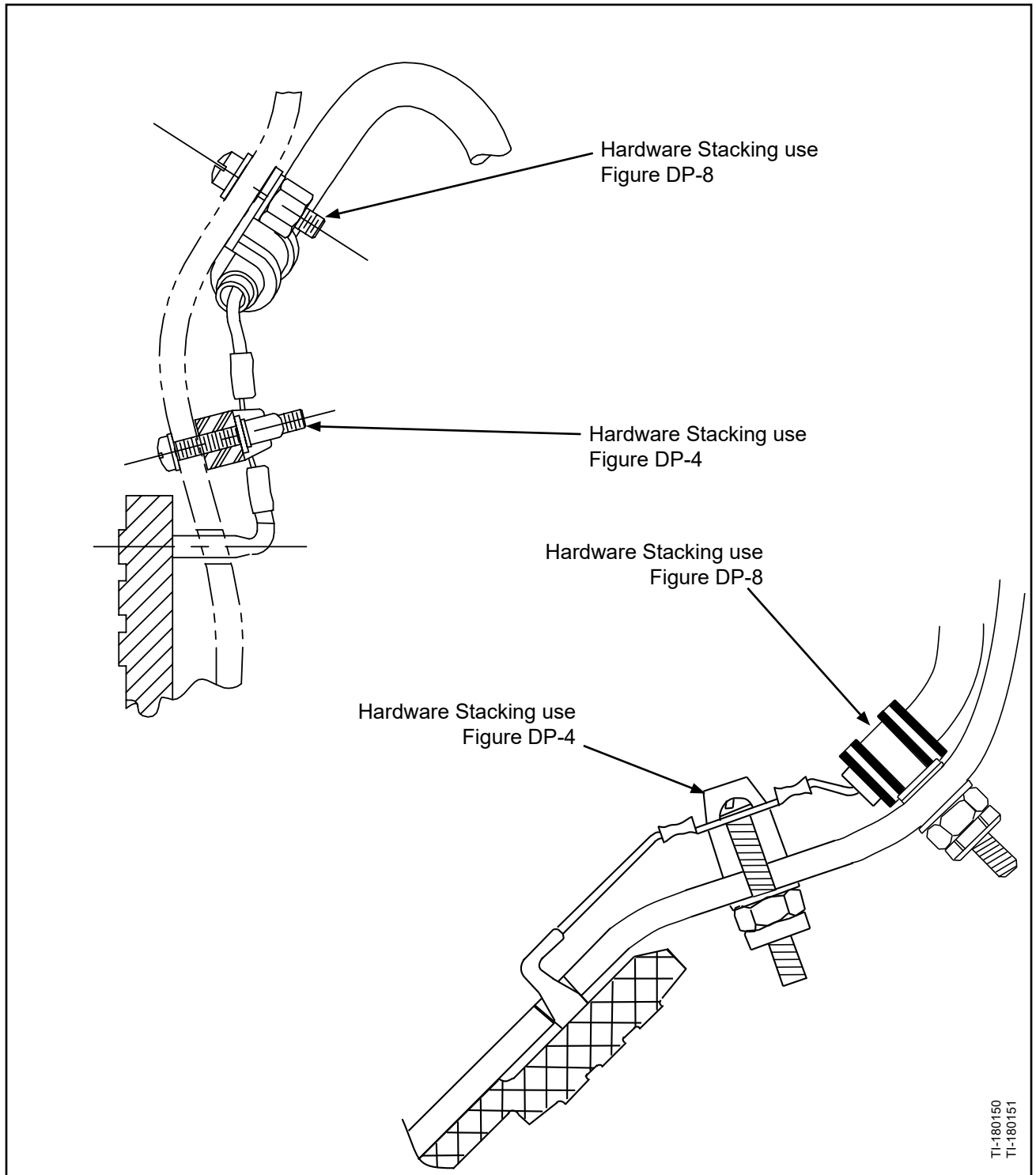


**Terminal Strip Hardware Configuration: Bulkhead Mounted  
Figure DP-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-944-1**



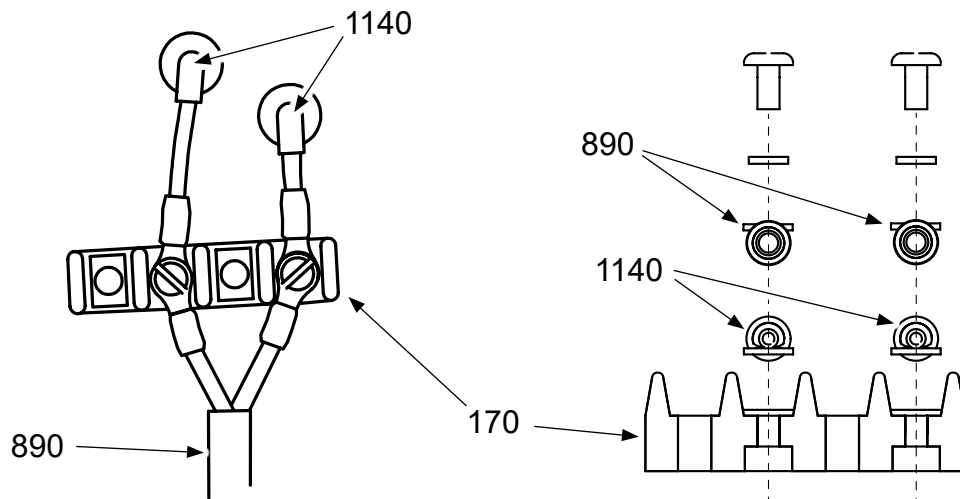
**Terminal Strip and Loop Clamp to Bulkhead Attachment  
Figure DP-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-944-1**

**Typical Two-wire Configuration**



**NOTE:** The illustrations show slip ring wires on a  
typical right-hand (rotation) propeller.

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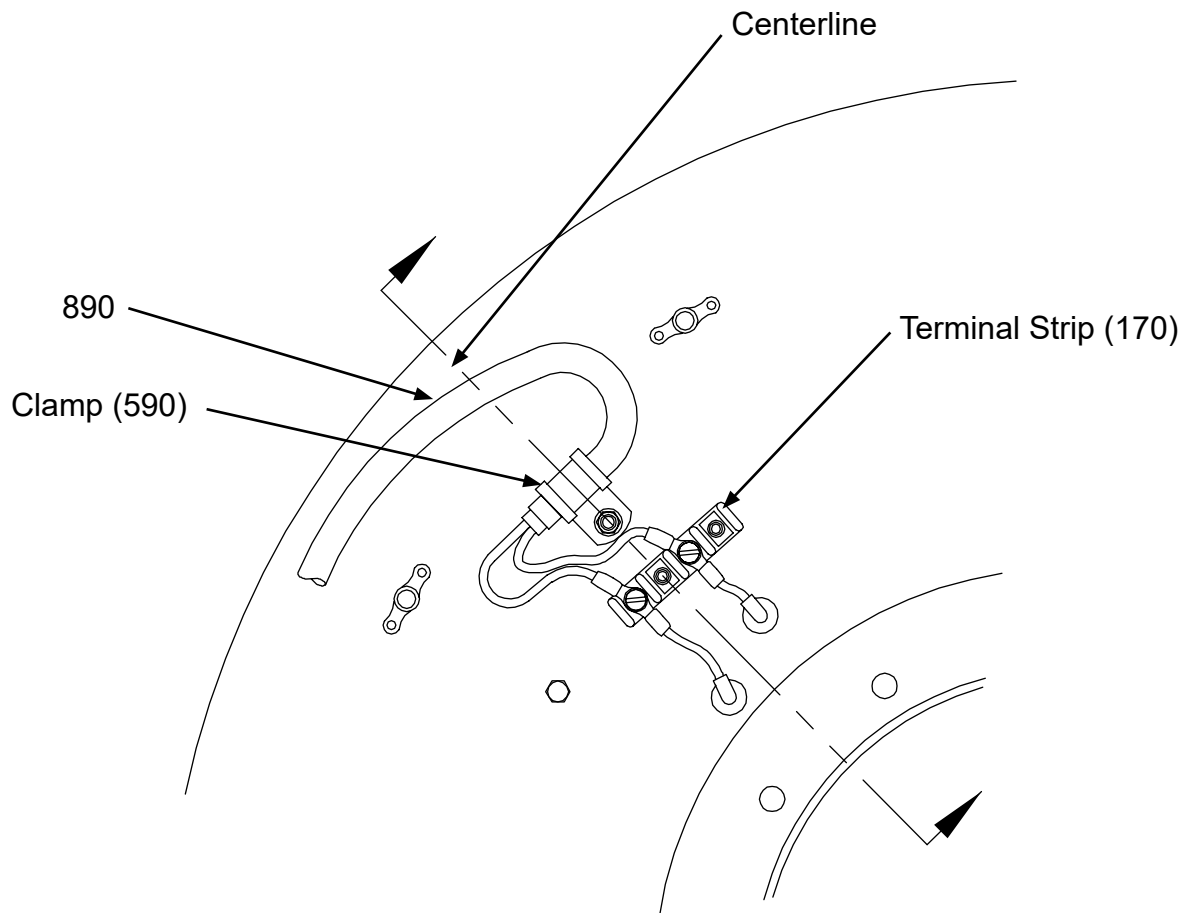
**Terminal Strip Lead Wire Configurations: Bulkhead Mounted  
Figure DP-6**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-944-1**

Orient the clamp (590) with the terminal strip (170) as shown.



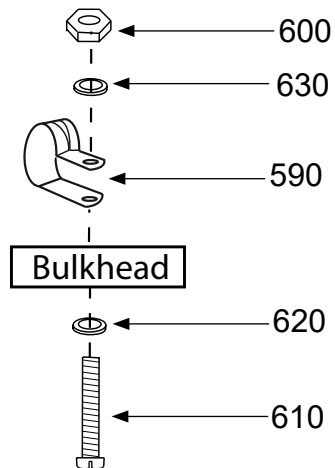
**Loop Clamp Orientation  
Figure DP-7**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**7931-67-944-1**



**Loop Clamp to Bulkhead Hardware Configurations  
Figure DP-8**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-944-1**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-944-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) SUPERSEDED BY 106576 INSTALLATION INSTRUCTION 11DP FIGURES: DP-1 thru DP-8</b>		
170	7931-1E1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY ITEM 170A	4	
170A	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES ITEM 170	4	
190	7931-2E1365	• TAPPED EYELET SUPERSEDED BY ITEM 190A	8	Y
190A	2H1365	• TAPPED EYELET SUPERSEDES ITEM 190	8	Y
200	B-3837-N616	• WASHER, CORROSION RESISTANT	8	Y
210	B-3854-41	• WASHER, LOCK	8	Y
220	B-6631-233	• SCREW, 6-32, FILLISTER HEAD, CRES	8	Y
590	B-6735	• CLAMP, LOOP, CUSHIONED	4	Y
600	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
610	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
620	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
630	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
650	B-3856-243	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
655	B-3854-42	• WASHER, LOCK	4	Y
660	B-6735	• CLAMP, LOOP, CUSHIONED	4	Y
890	7931-3E2360-5	• WIRE HARNESS SUPERSEDED BY ITEM 890A	4	Y
890A	3H2360-5	• WIRE HARNESS SUPERSEDES ITEM 890	4	Y
900	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	12	Y
1140	7931-4E4015-1	• SLIP RING ASSEMBLY SUPERSEDED BY ITEM 1140A	1	
1140A	4H4015-1	• SLIP RING ASSEMBLY SUPERSEDES ITEM 1140	1	
1160	B-3384-8H	• BOLT, 1/4-28, HEX HEAD	8	Y
1210	B-3851-0463	• WASHER	8	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 7931-67-944-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-67-944-1**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**103253**

**DQ. Installation Instruction 11DQ**

- (1) Install the three washers (1305), existing hub clamping nut, existing hub clamping washer, and bracket (1300) to the hub clamping bolt (1315) in accordance with Figure DQ-1. Orient the bracket (1300) parallel to the blade.
  - (a) Torque the hub clamping nut to 22-25 ft. lb. (29-33 N•m).
- (2) Using the screws (1170), attach the slip ring (1140) and the bulkhead to the hub as shown in Figure DQ-2.
  - (a) Torque each screw (1170) 8-10 ft. lb. (1.01-1.35 N•m).
  - (b) Perform slip ring run-out check in accordance with the Check chapter in this manual.
- (3) Position the terminal strip (170) on the bulkhead in accordance with Orientation A in Figure DQ-3,
- (3) Using screws (220), washers (200 and 210), and tapped eyelets (190), attach the terminal strip (170) to the bulkhead in accordance with Figure DQ-3.
  - (a) Torque the screws (220) to 10-12 In-Lbs (1.12-1.35 N•m).
- (4) Position the propeller blades at reverse blade angle.
- (5) Using screw (320) and washer (330), attach the terminal strip (310) to the counterweight. Refer to Figure DQ-4 and Figure DQ-5.
  - (a) Torque the screws to 10-12 In-Lbs (1.12-1.35 N•m).
- (6) Route the terminal ends of the de-ice boot lead wires through the hole in counterweight, as shown in Figure DQ-5.
- (7) Install the de-ice boot lead wires and de-ice wire harness lead wires (890) to the terminal strip (310) in accordance with Figure DQ-5 and Figure DQ-6.
  - (a) Tighten the terminal screws until snug.
- (8) Press the spring pin (670) perpendicularly into the hole as shown in Figure DQ-5.
  - (a) The spring pin (670) must extend to a height of 0.23 - 0.27 inch (5.8 - 6.8 mm).
- (9) Install the clamp (660), around the wire harness (890) as shown in Figure DQ-5.

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**103253**

DQ. Installation Instruction 11DQ - continued

- (10) Install the clamp (660) and washers (655 and 665) on the screw (650).
  - (a) Apply threadlocker CM399 to the threads of the screw (650).
- (11) Using screw (650) and washers (655 and 665), install the clamp (660) to the counterweight in accordance with Figure DQ-5 and Figure DQ-7.
  - (a) Position the clamp against the spring pin (670).
- (12) Torque the screw (650) to 22-25 In-Lbs (2.48-2.82 N•m).
- (13) Using the screw (805) and washer (815), attach the tie mount (810) to the counterweight in two locations as shown in Figure DQ-5.
- (14) Using tie strap (910), secure the de-ice boot lead wires to the counterweight, outboard of the terminal strip (310) as shown in Figure DQ-5.
  - (a) Route the tie strap (910) over the de-ice boot lead wires and through the tie mount (810) as shown in Figure DQ-5.
  - (b) Position the tie strap (910) head in the approximate location on the side of the counterweight, as shown in Figure DQ-5.
  - (c) Do not tighten the tie strap (910) at this time.
- (15) Using tie strap (910), secure the de-ice boot lead wires to the counterweight inboard of the terminal strip (310) and the clamp (660) as shown in Figure DQ-5.
  - (a) Route the tie strap (910) over the de-ice boot lead wires, under the wire harness (890) and through the tie mount (810) as shown in Figure DQ-5.
  - (b) Position the tie strap (910) head in the approximate location shown on the side of the counterweight as shown in Figure DQ-5. Do not tighten the tie strap (910) at this time.
- (16) Verify that the de-ice boot lead wires are taut through the counterweight hole.
- (17) Tighten the tie straps (910) inboard and outboard of the terminal strip (310).
- (18) Secure the tie straps (910) to de-ice boot lead wires by installing the tie straps (930) around the de-ice boot lead wires and the tie strap (910) in two locations on the side of the counterweight as shown in Figure DQ-5.
- (19) Position the tie strap (930) head in the approximate locations shown in Figure DQ-5.
- (20) Position the wire harness (890) on the bracket (1300) with the O-ring as shown in Figure DQ-8.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

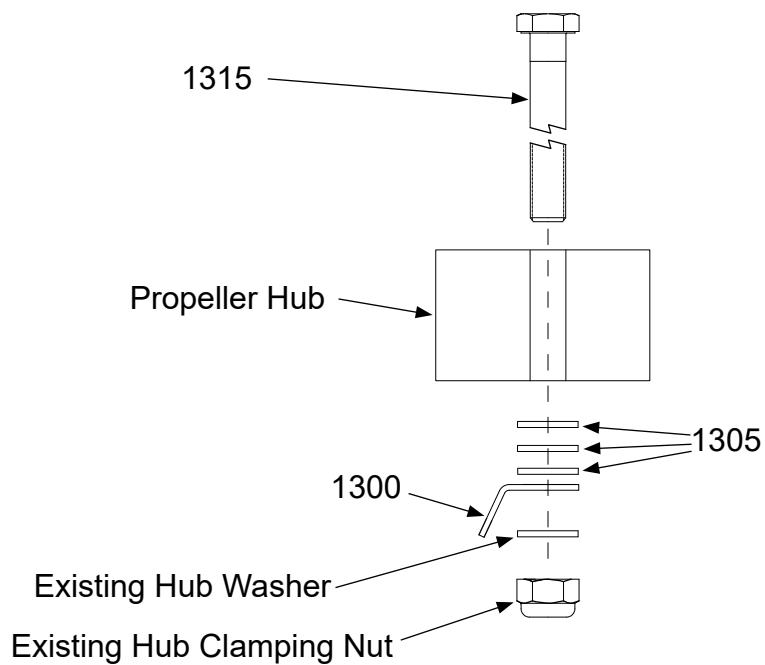
**103253**

DQ. Installation Instruction 11DQ - continued

- (21) Install the tie straps (840) as shown in Figure DQ-8. Twisting of the lead wire is not permitted.
- (22) Install the slip ring lead wires and de-ice wire harness (890) to the bulkhead terminal strip (170) in accordance with Figure DQ-9.
- (23) Tighten the terminal screws until snug.
- (24) Cycle the propeller from low angle to high angle to verify proper wire harness installation. Make sure the wire harness is not obstructed during cycling.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103253**

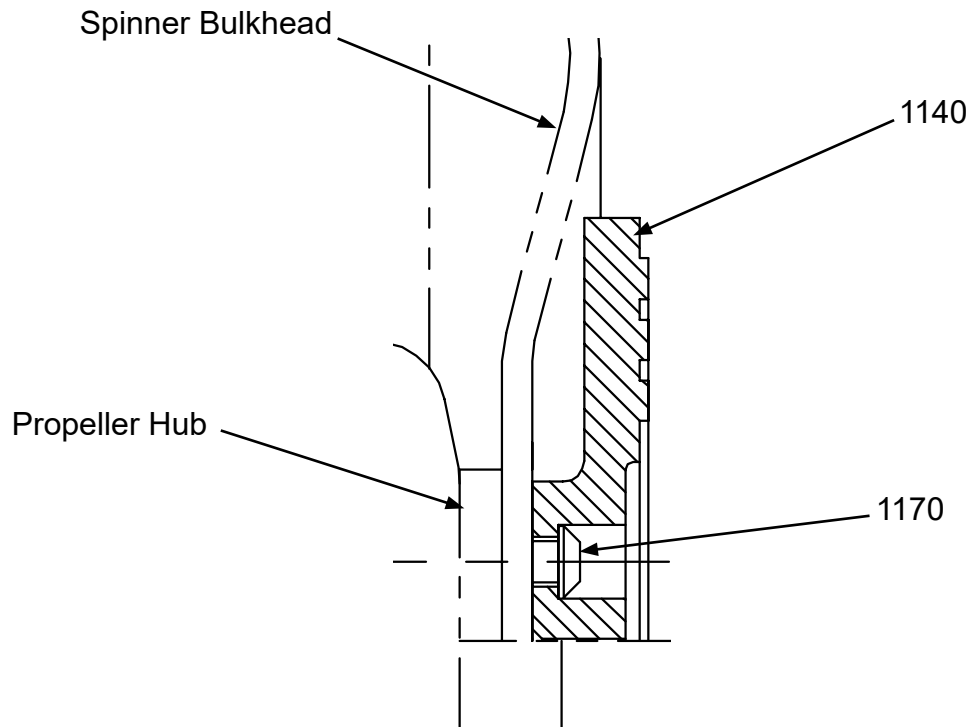


TI-1800811

**Wire Harness Bracket Hardware Configurations  
Figure DQ-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103253**

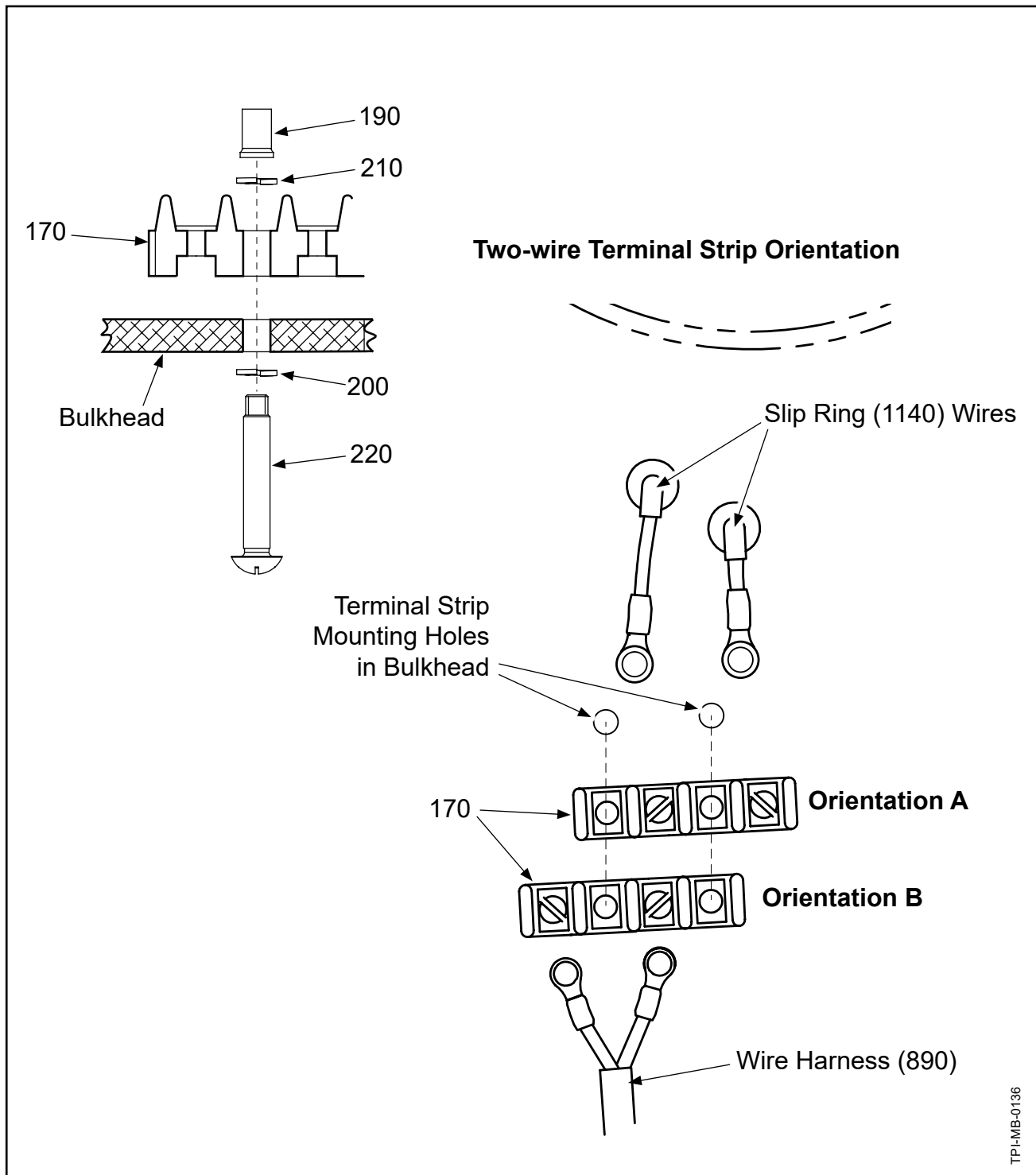


TI-18000142

**Slip Ring Mounting  
Figure DQ-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

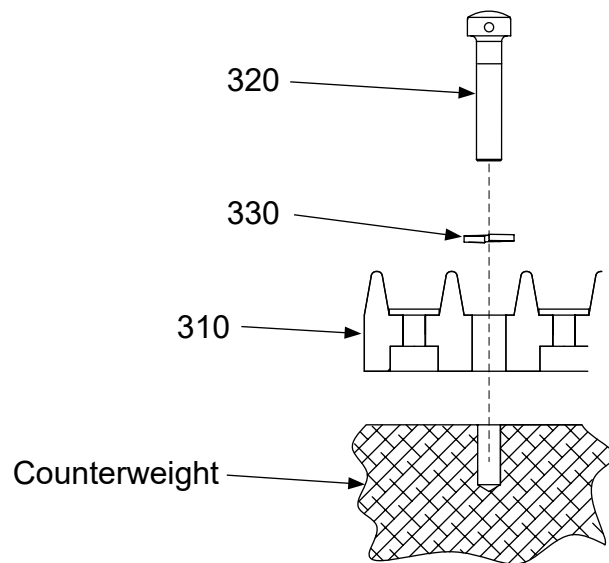
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103253**



**Terminal Strip Hardware Configuration: Bulkhead Mounted  
Figure DQ-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103253**

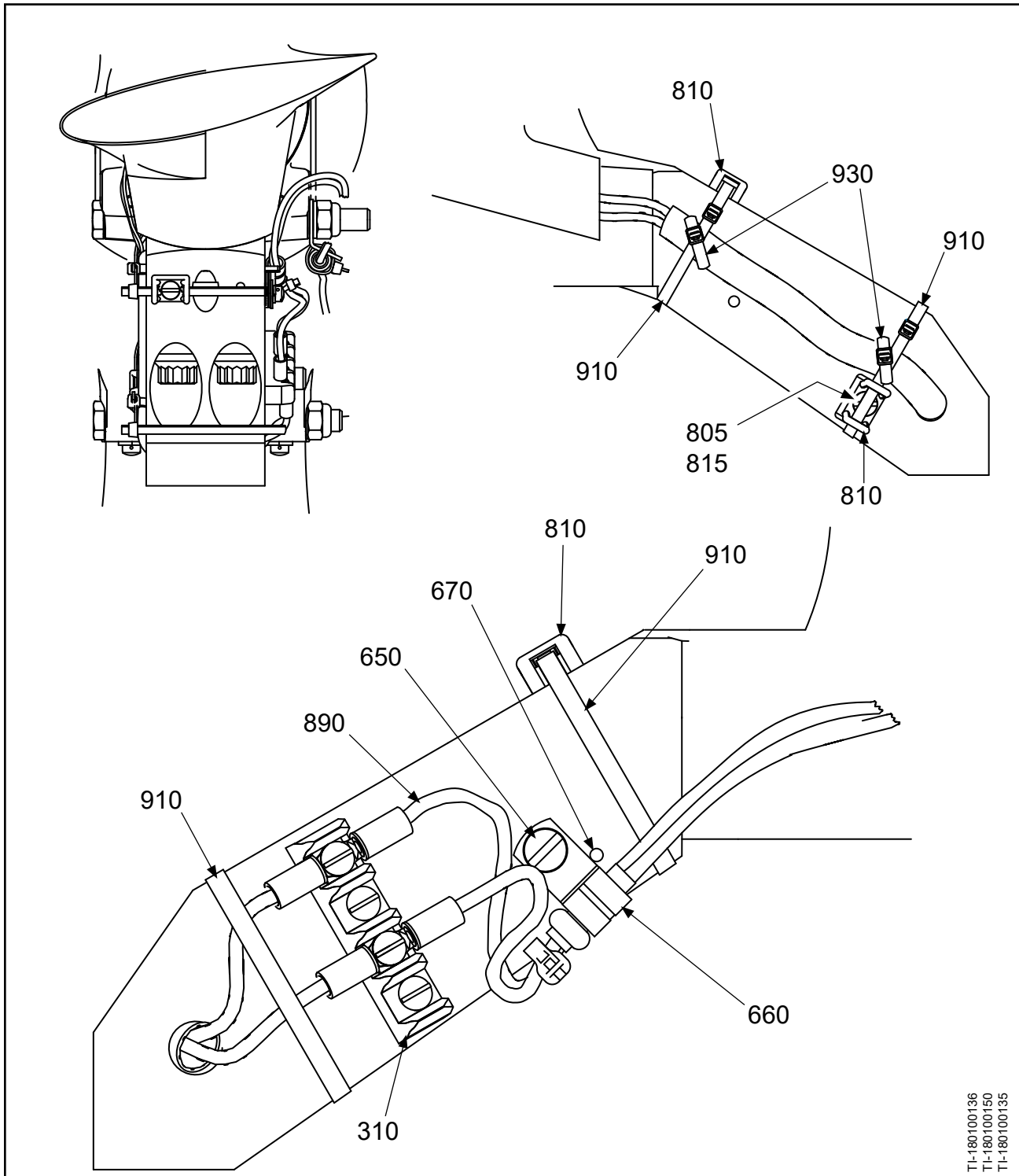


TPI-MB-0137

**Terminal Strip Hardware Configurations: Counterweight Mounted  
Figure DQ-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103253**

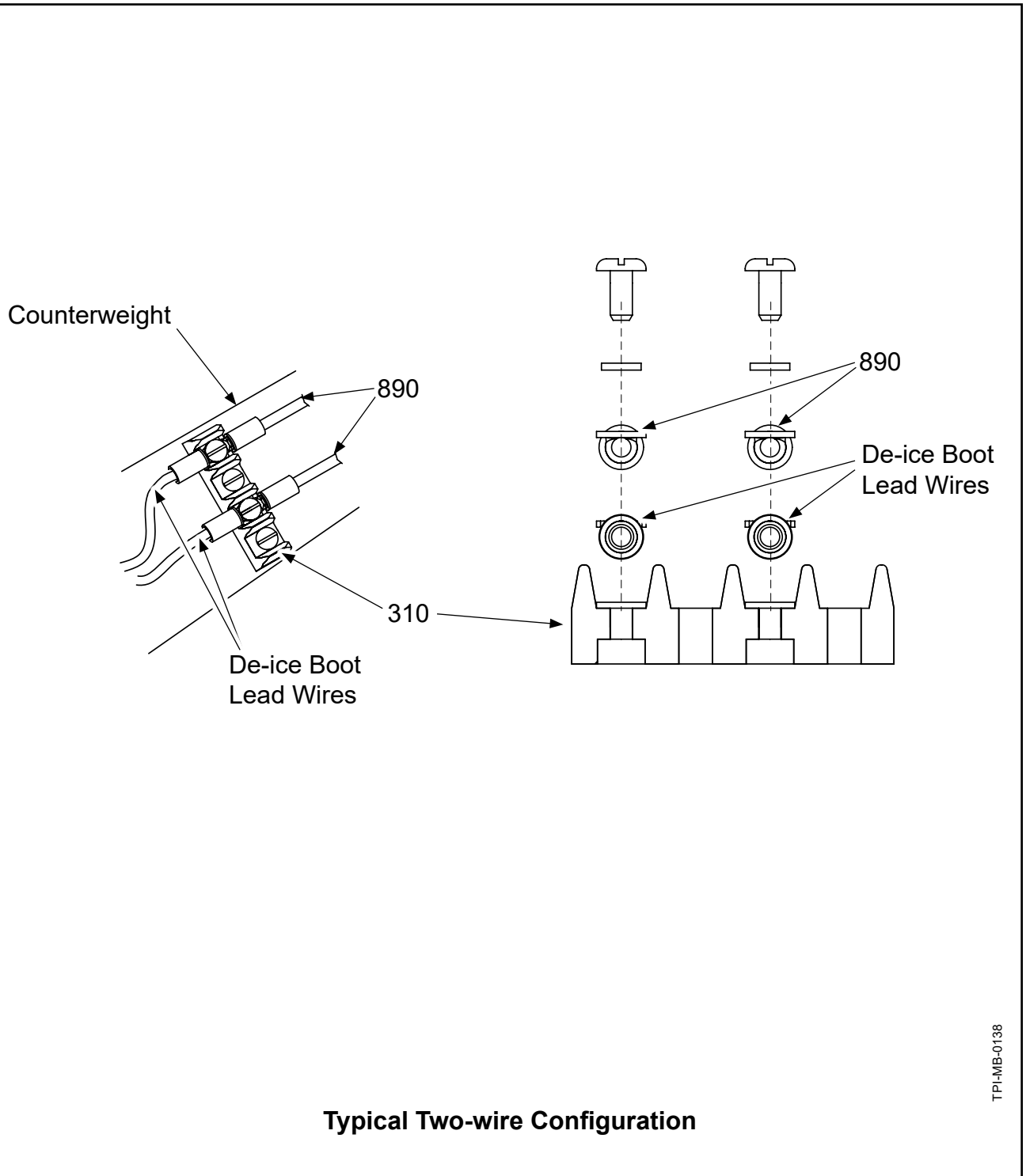


**Wire Harness to Counterweight  
Figure DQ-5**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

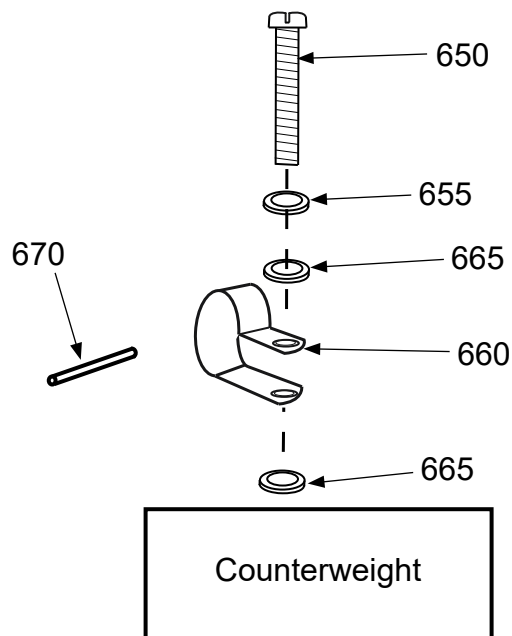
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103253**



**Terminal Strip Lead Wire Configurations: Counterweight Mounted  
Figure DQ-6**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

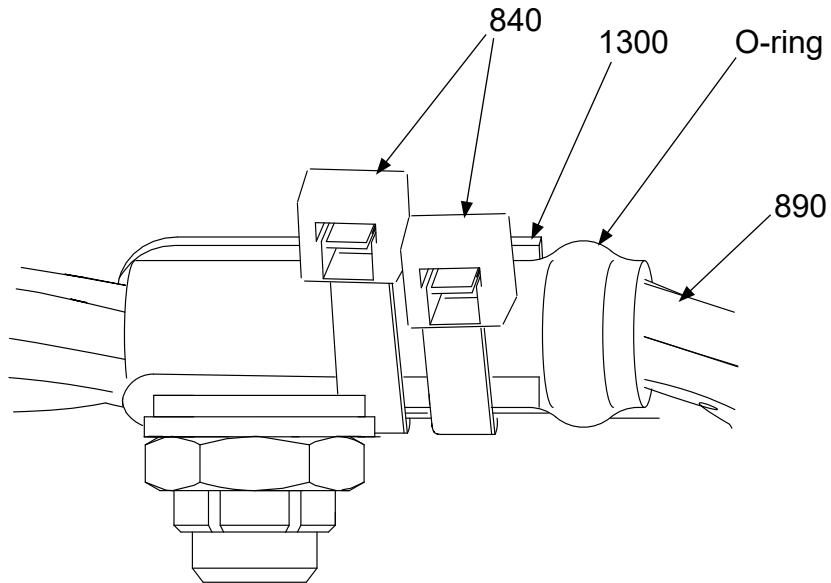
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103253**



**Loop Clamp to Counterweight Hardware Configuration  
Figure DQ-7**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103253**



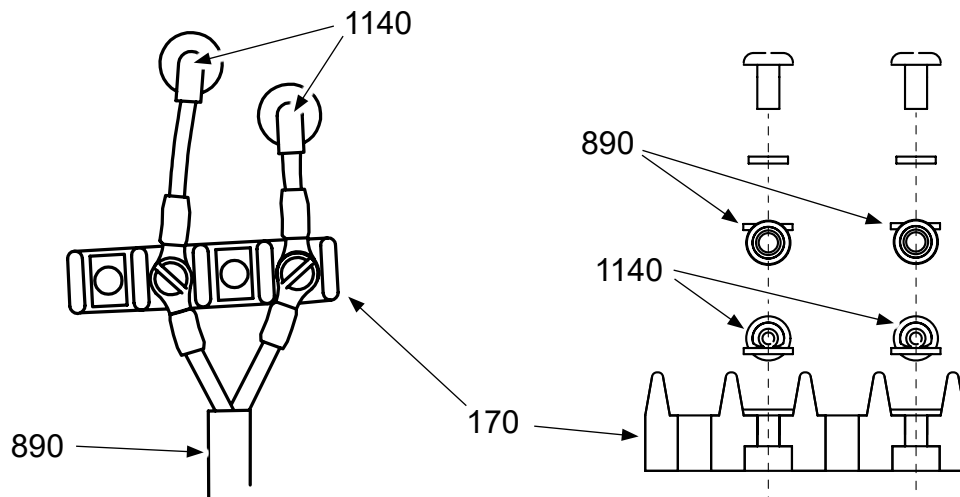
TL-1800802

**Wire Harness to De-ice Bracket  
Figure DQ-8**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103253**

**Typical Two-wire Configuration**



**NOTE:** The illustrations show slip ring wires on a typical right-hand (rotation) propeller.

TP1-MB-0129

**Terminal Strip Lead Wire Configuration: Bulkhead Mounted  
Figure DQ-9**

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**103253**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>103253</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) - POST HC-SL-30-295 INSTALLATION INSTRUCTION 11DQ FIGURES: DQ-1 thru DQ-9</b>		
170	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM	4	
190	2H1365	• TAPPED EYELET	8	Y
200	B-3854-41	• WASHER, LOCK	8	Y
210	B-3854-41	• WASHER, LOCK	8	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	8	Y
645	B-3855-31	• DELETED	-	
650	B-3856-246	• SCREW, 8-32, FILLISTER HEAD	4	Y
655	B-3854-42	• WASHER, LOCK	4	Y
665	B-3837-N832	• WASHER, CORROSION RESISTANT	8	Y
660	B-3853-F5	• CLAMP, LOOP, CUSHIONED	4	Y
670	B-3842-0500	• SPRING PIN, 3/32", CRES	4	Y
670A	B-6378-7	• SPRING PIN, 1/8" CRES (OVERSIZED, MANUAL 133C TR-079)	A/R	Y
310	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM	4	
320	B-6631-231	• SCREW, 6/32, FILLISTER HEAD, CRES	8	Y
330	B-3854-41	• WASHER, LOCK	8	Y
805	102440	• SCREW, 8/32, BUTTON HEAD	8	
810	7931-TM2S8(BLK)	• TM2S8-C-0, BLACK TIE MOUNT	8	
815	B-3854-42	• WASHER, LOCK	8	Y
890	102900	• WIRE HARNESS	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	8	Y
840	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	8	Y
1300	B-6265	• BRACKET, WIRE HARNESS	4	
1305	B-3834-0663	• WASHER	12	Y
1315	102691	• BOLT, 3/8-24, HEX HEAD	4	
1140	4H3008-1	• SLIP RING ASSEMBLY	1	
1170	A-2070-10	• SCREW, 1/4-28, BUTTON HEAD	8	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 103253**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103253**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**103794**

**DR. Installation Instruction 11DR**

- (1) Install the existing hub washer, existing hub clamping nut, bracket (1300), and spacer (1325) to the hub clamping bolt (1315) in accordance with Figure DR-1.
  - (a) Orient the bracket (1300) parallel to the blade.
  - (b) Torque the nut to 22-25 ft. lb. (29-33 N•m).
- (2) Using the screws (1170), attach the slip ring (1140) and the bulkhead to the hub in accordance with Figure DR-2.
  - (a) Torque each screw (1170) to 8-10 ft. lb. (1.01-1.35 N•m).
  - (b) Perform slip ring run-out check in accordance with the Check chapter in this manual.
- (3) Position the terminal strip (170) on the bulkhead in accordance with Orientation A shown in Figure DR-3.
- (4) Using screws (220), washers (200 and 210), and tapped eyelets (190), attach the terminal strip (170) to the bulkhead in accordance with Figure DR-3.
  - (a) Torque the screws (220) to 10-12 In-Lbs (1.12-1.35 N•m).
- (5) Move the propeller blades to reverse blade angle.
- (6) Using screw (320) and washer (330), attach the terminal strip (310) to the counterweight. Refer to Figure DR-4 and Figure DR-5.
  - (a) Torque the screws to 10-12 In-Lbs (1.12-1.35 N•m).
- (7) Route the terminal ends of the de-ice boot lead wires through the hole in the counterweight, as shown in Figure DR-4.
- (8) Install the de-ice boot lead wires and de-ice wire harness lead wires (890) to the terminal strip (310) in accordance with Figure DR-4 and Figure DR-6.
  - (a) Tighten the terminal strip screws until snug.
- (9) Press the spring pin (670) perpendicularly into the hole as shown in Figure DR-4. The spring pin (670) must extend to a height of 0.23-0.27 inch (5.8-6.8 mm).
- (10) Install the clamp (660), around the wire harness (890) as shown in Figure DR-4.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**103794**

**DR.**    Installation Instruction 11DR - continued

- (11) Install the clamp (660) and washers (655 and 665) on the screw (650). Apply threadlocker CM399 to the threads of the screw (650).
- (12) Using screw (650) and washers (655 and 665), install the clamp (660) to the counterweight in accordance with Figure DR-4 and Figure DR-7.
  - (a) Position the clamp against the spring pin (670) in accordance with Figure DR-4.
  - (b) Torque the screw (650) to 22-25 In-Lbs (2.48-2.82 N•m).
- (13) Using the screw (805) and washer (815), attach the tie mount (810) to the counterweight as shown in Figure DR-4. Tighten the screw (805) until snug.
- (14) Using tie strap (910), secure the de-ice boot lead wires to the counterweight outboard of the terminal strip (310) as shown in Figure DR-4.
  - (a) Route the tie strap (910) over the de-ice boot lead wires and in the counterweight groove as shown in Figure DR-4.
  - (b) Position the tie strap (910) head in the approximate location on the side of the counterweight, as shown in Figure DR-4.
  - (c) Do not tighten the tie strap (910) at this time.
- (15) Using the tie strap (910), secure the de-ice boot lead wires to the counterweight inboard of the terminal strip (310) and the clamp (660) as shown in Figure DR-4.
  - (a) Route the tie strap (910) over the de-ice boot lead wires, under the wire harness (890), and through the tie mount (810) as shown in Figure DR-4.
  - (b) Position the head of tie strap (910) on the side of the counterweight as shown in Figure DR-4. Do not tighten the tie strap (910) at this time.
- (16) Verify that the de-ice boot lead wires are taut through the counterweight hole.
- (17) Tighten the tie straps (910) inboard and outboard of the terminal strip (310).
- (18) Secure the tie straps (910) to the de-ice boot lead wires by installing the tie straps (930) around the de-ice boot lead wires and the tie strap (910) in two locations on the side of the counterweight as shown in Figure DR-4.
- (19) Position the head of tie strap (930) in the approximate location shown in Figure DR-4.
- (20) Position the wire harness (890) on the bracket (1300) with the O-ring as shown in Figure DR-8.



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

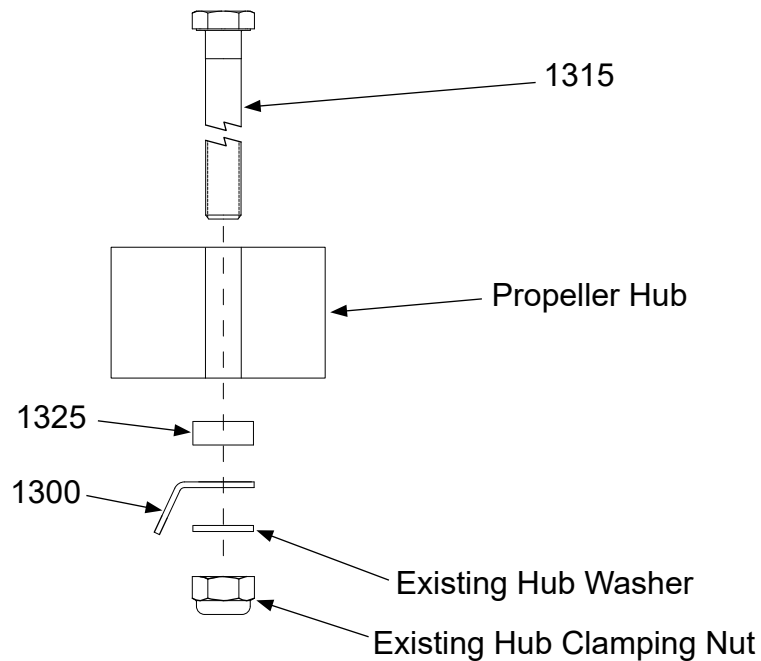
**103794**

DR. Installation Instruction 11DR - continued

- (21) Install the tie straps (840) as shown in Figure DR-8. Twisting of the lead wire is not permitted.
- (22) Install the slip ring lead wires and de-ice wire harness (890) to the bulkhead terminal strip (170) in accordance with Figure DR-9.
- (23) Tighten the terminal screws until snug.
- (24) Cycle the propeller from low angle to high angle to verify proper wire harness installation. Make sure the wire harness is not obstructed during cycling.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103794**



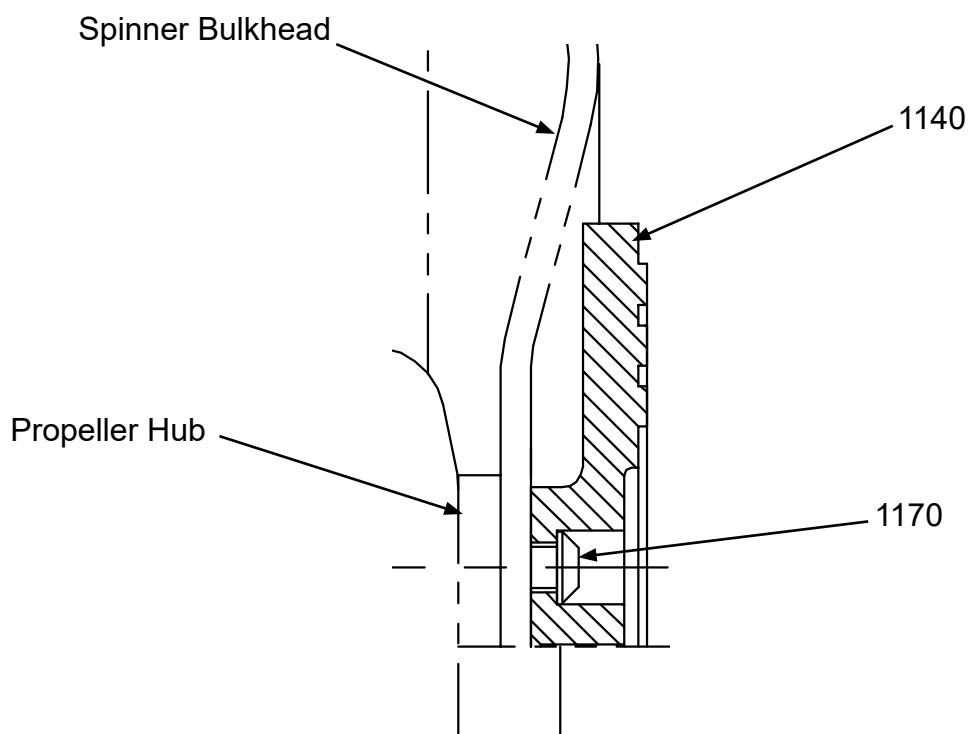
TL-1800808

**Wire Harness Bracket Hardware Configurations  
Figure DR-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**103794**



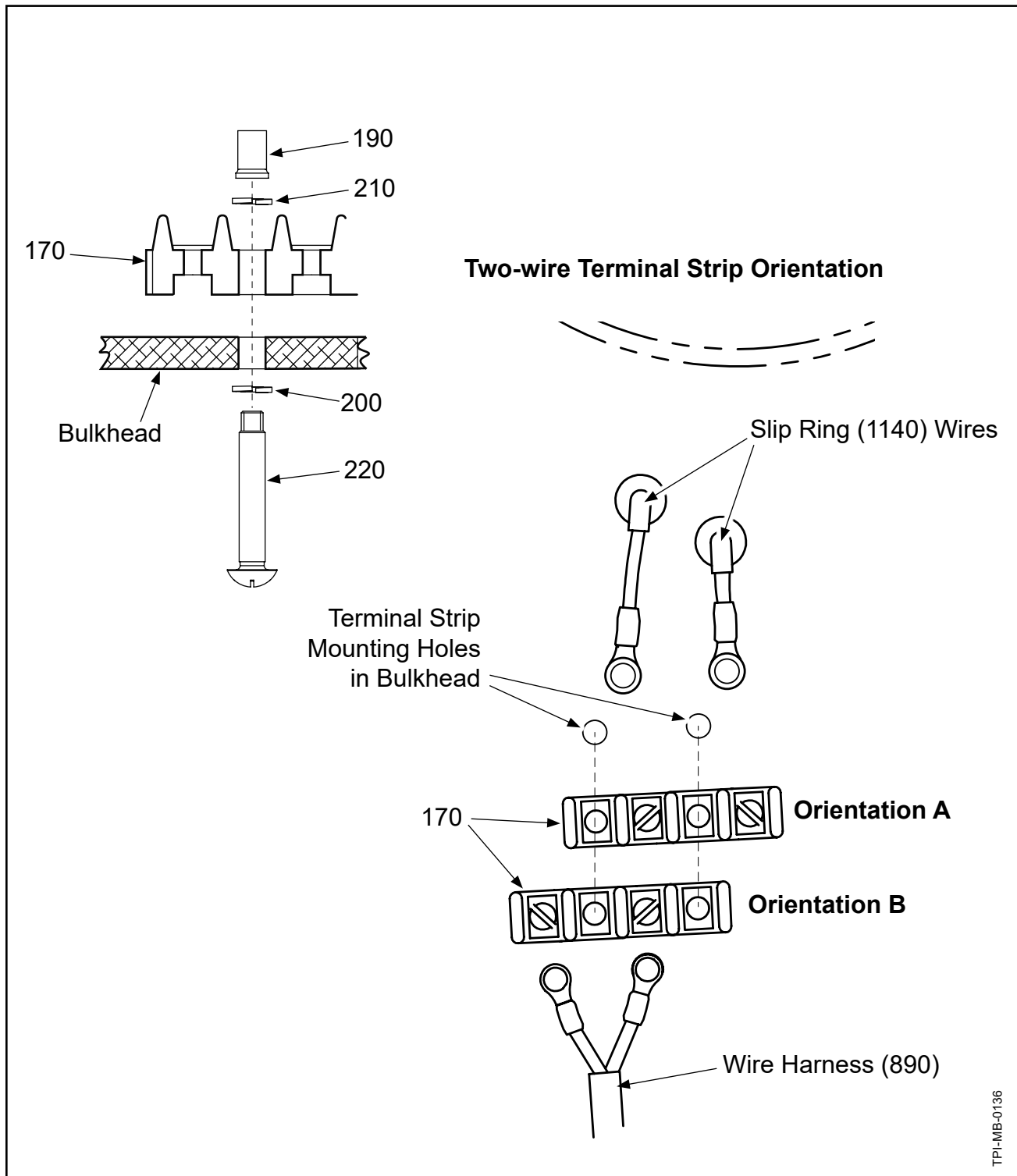
TI-18000142

**Slip Ring Mounting  
Figure DR-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

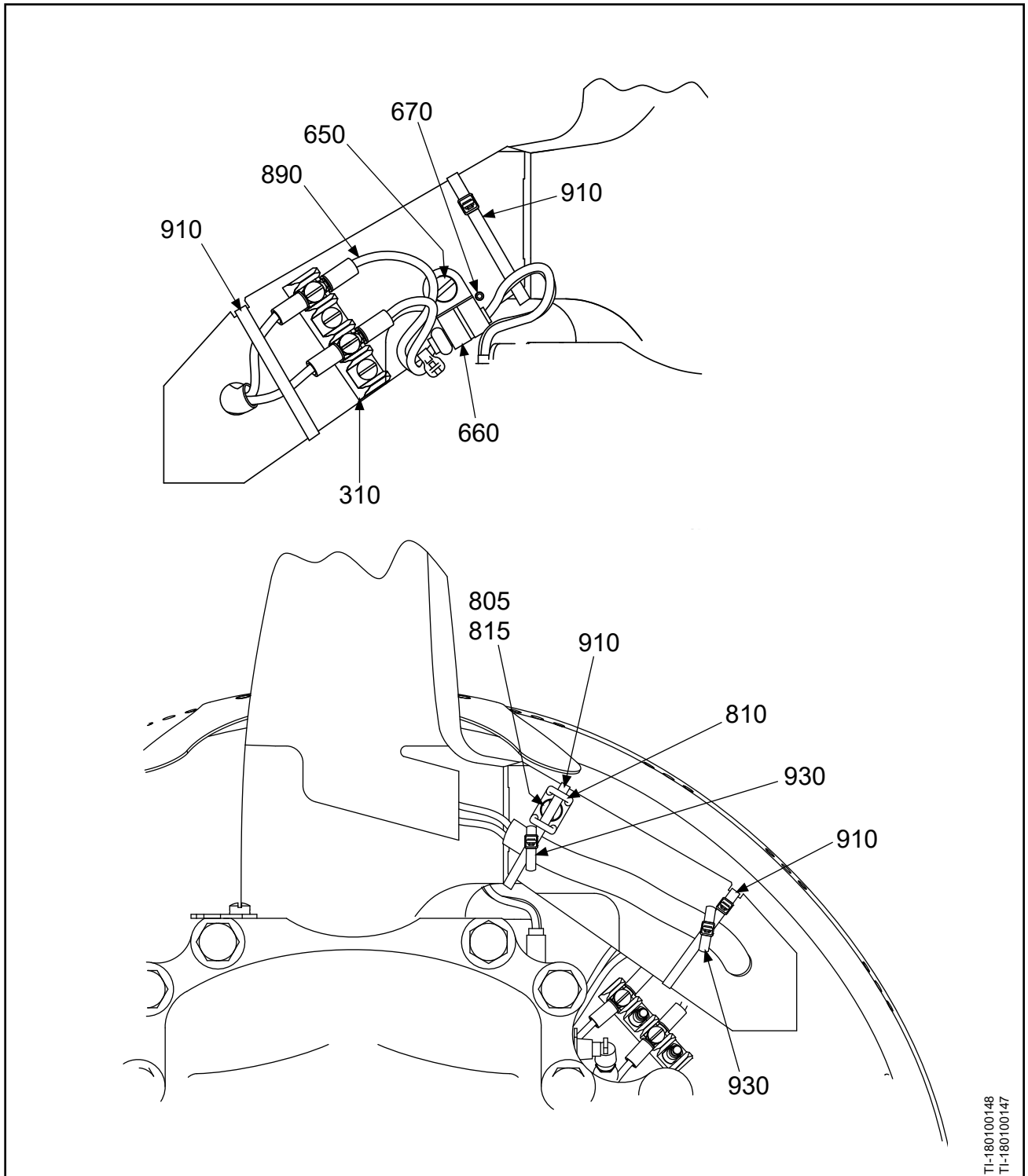
**103794**



**Terminal Strip Hardware Configurations: Bulkhead Mounted  
Figure DR-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

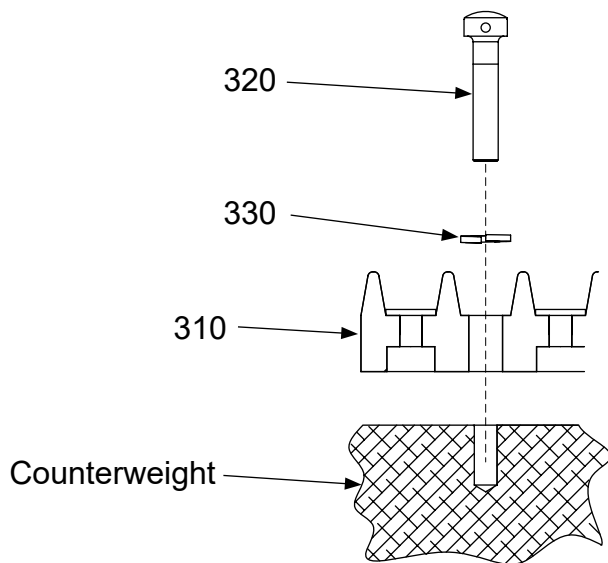
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103794**



**Wire Harness to Counterweight  
Figure DR-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103794**

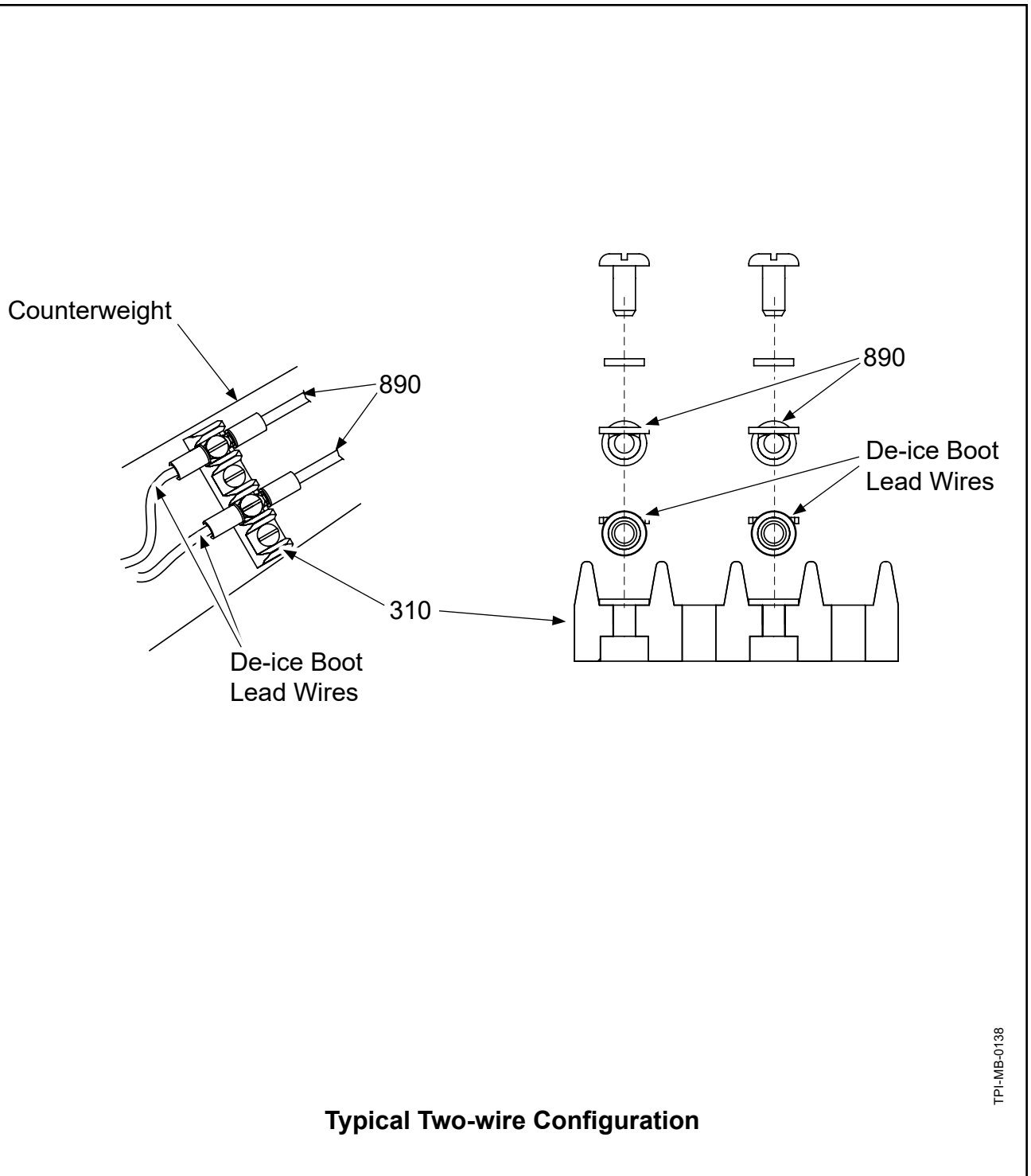


TPI-MB-0137

**Terminal Strip Hardware Configurations: Counterweight Mounted  
Figure DR-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

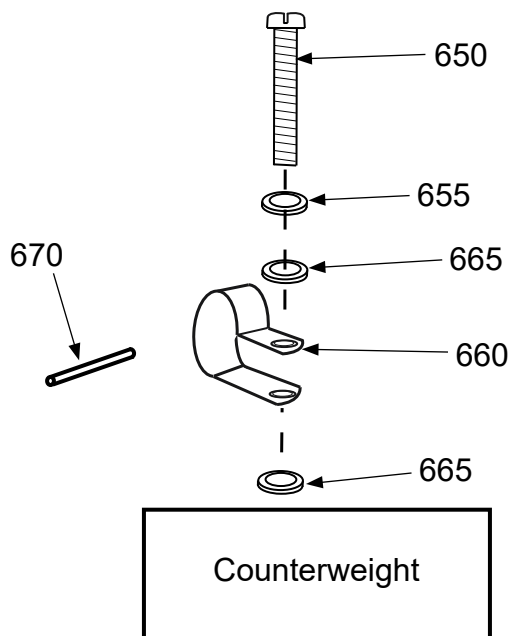
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103794**



**Terminal Strip Lead Wire Configurations: Counterweight Mounted  
Figure DR-6**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103794**



TL00180ACC  
TL00180BCC

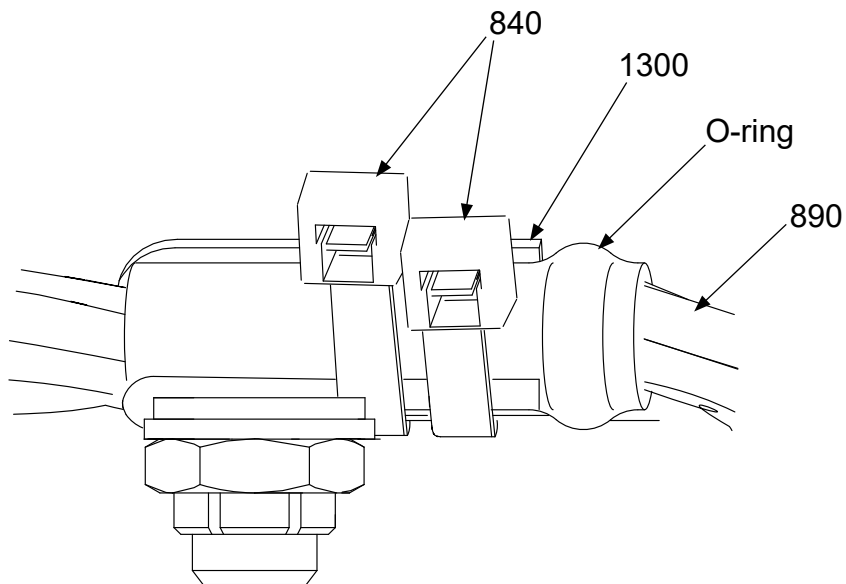
**Loop Clamp to Counterweight Hardware Configurations  
Figure DR-7**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**103794**



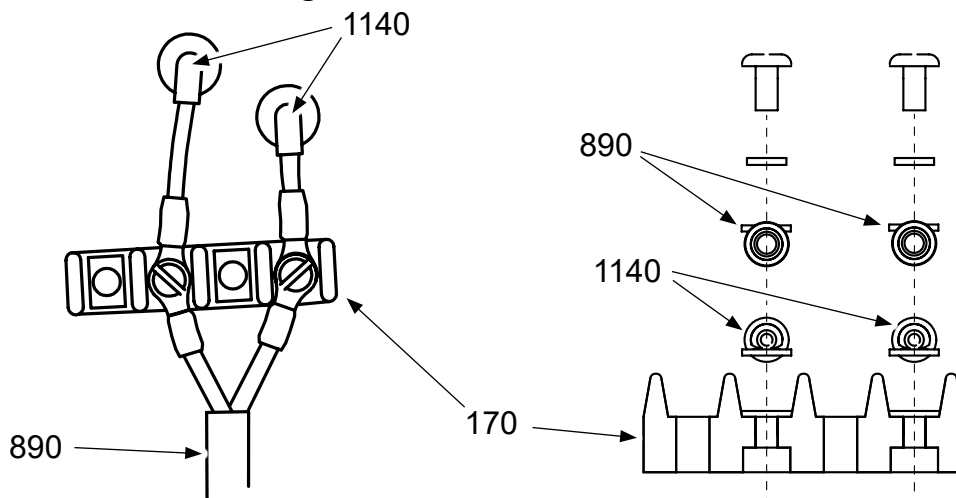
TL-1800802

**Wire Harness to De-ice Bracket  
Figure DR-8**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103794**

**Typical Two-wire Configuration**



**NOTE:** The illustrations show slip ring wires on a typical right-hand (rotation) propeller.

TP-1MB-0129

**Terminal Strip Lead Wire Configuration: Bulkhead Mounted  
Figure DR-9**

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103794**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>103794</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11DR</b> <b>FIGURES: DR-1 thru DR-9</b>		
170	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM	4	
190	2H1365	• TAPPED EYELET	8	Y
200	B-3854-41	• WASHER, LOCK	8	Y
210	B-3854-41	• WASHER, LOCK	8	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	8	Y
645	B-3855-31	• DELETED	-	
650	B-3856-246	• SCREW, 8-32, FILLISTER HEAD	4	Y
655	B-3854-42	• WASHER, LOCK	4	Y
665	B-3837-N832	• WASHER, CORROSION RESISTANT	8	Y
660	B-3853-F5	• CLAMP, LOOP, CUSHIONED	4	Y
670	B-3842-0500	• SPRING PIN, 3/32", CRES	4	Y
310	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM	4	
320	B-6631-231	• SCREW, 6/32, FILLISTER HEAD, CRES	8	Y
330	B-3854-41	• WASHER, LOCK	8	Y
805	102440	• SCREW, 8/32, BUTTON HEAD	4	
810	7931-TM2S8(BLK)	• TM2S8-C-0, BLACK TIE MOUNT	4	
815	B-3854-42	• WASHER, LOCK	4	Y
890	102900	• WIRE HARNESS	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	8	Y
840	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	8	Y
1300	B-6265	• BRACKET, WIRE HARNESS	4	
1315	102691	• BOLT, 3/8-24, HEX HEAD	4	
1325	A-2246-5	• SPACER, ALUMINUM	4	
1140	4H3094-1	• SLIP RING ASSEMBLY	1	
1170	A-2070-10	• SCREW, 1/4-28, BUTTON HEAD	8	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 103794**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103794**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

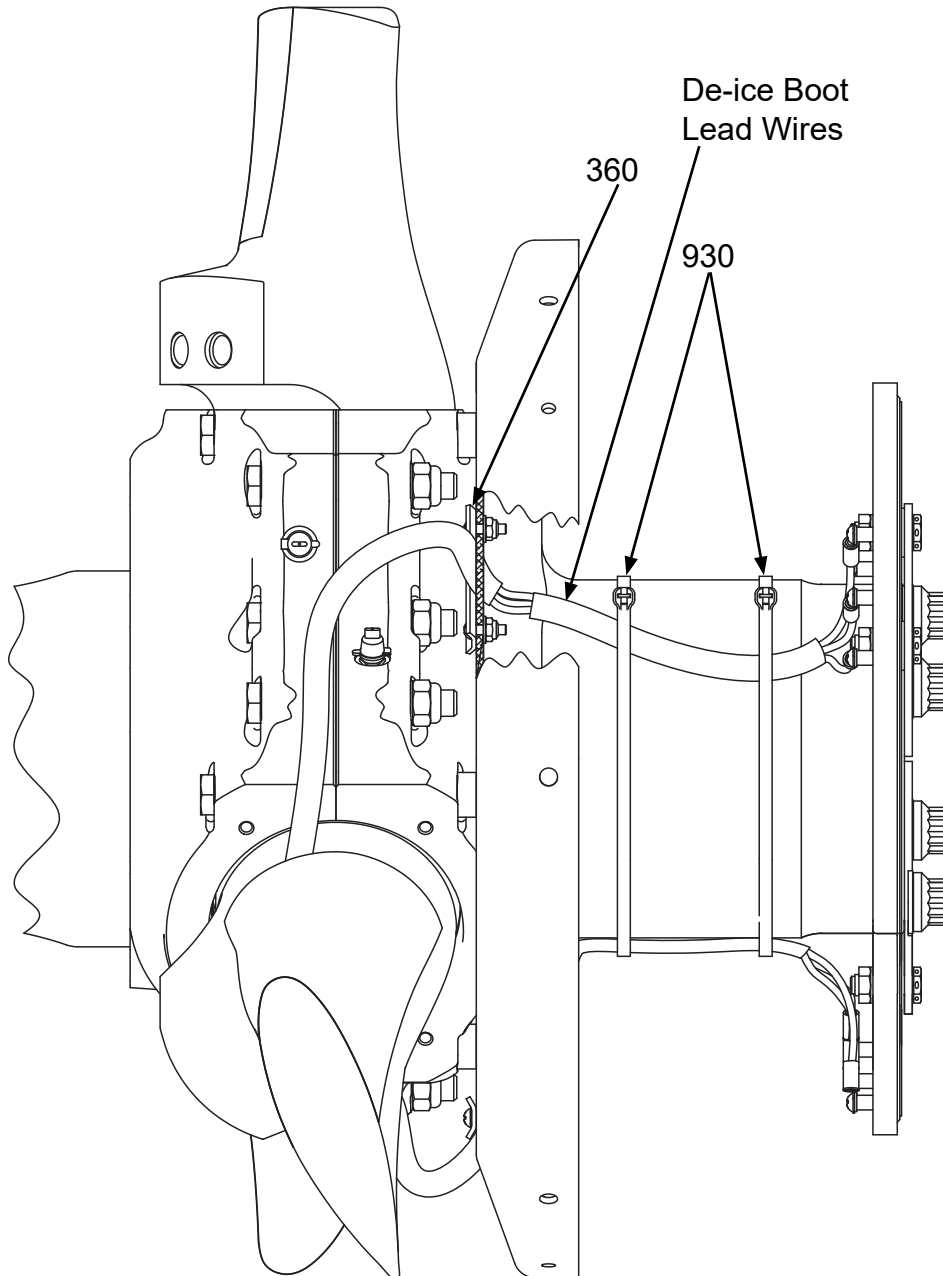
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**104267**

**DS.    Installation Instruction 11DS**

- (1) Using the lead clip (360) secure the de-ice boot lead wires to the bulkhead in accordance with Figure DS-1 and Figure DS-2.
  - (a) Position the alignment marks on the de-ice boot lead wires with the edges of the lead clip (360) as shown in Figure DS-2.
- (2) Tighten the nut (380) until snug.
- (3) Attach the terminals of the de-ice boot lead wires to the slip ring assembly using the following steps:
  - (a) Connect the de-ice boot lead wires "A" terminal to the outboard terminal of the slip ring assembly.
  - (b) Connect the de-ice boot lead wires "B" terminal to the inboard terminal of the slip ring assembly.
  - (c) Connect the de-ice boot lead wires "C" terminal to the ground terminal of the slip ring assembly.
- (4) Using the tie straps (930), secure the de-ice boot lead wires to the hub as shown in Figure DS-1.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**104267**



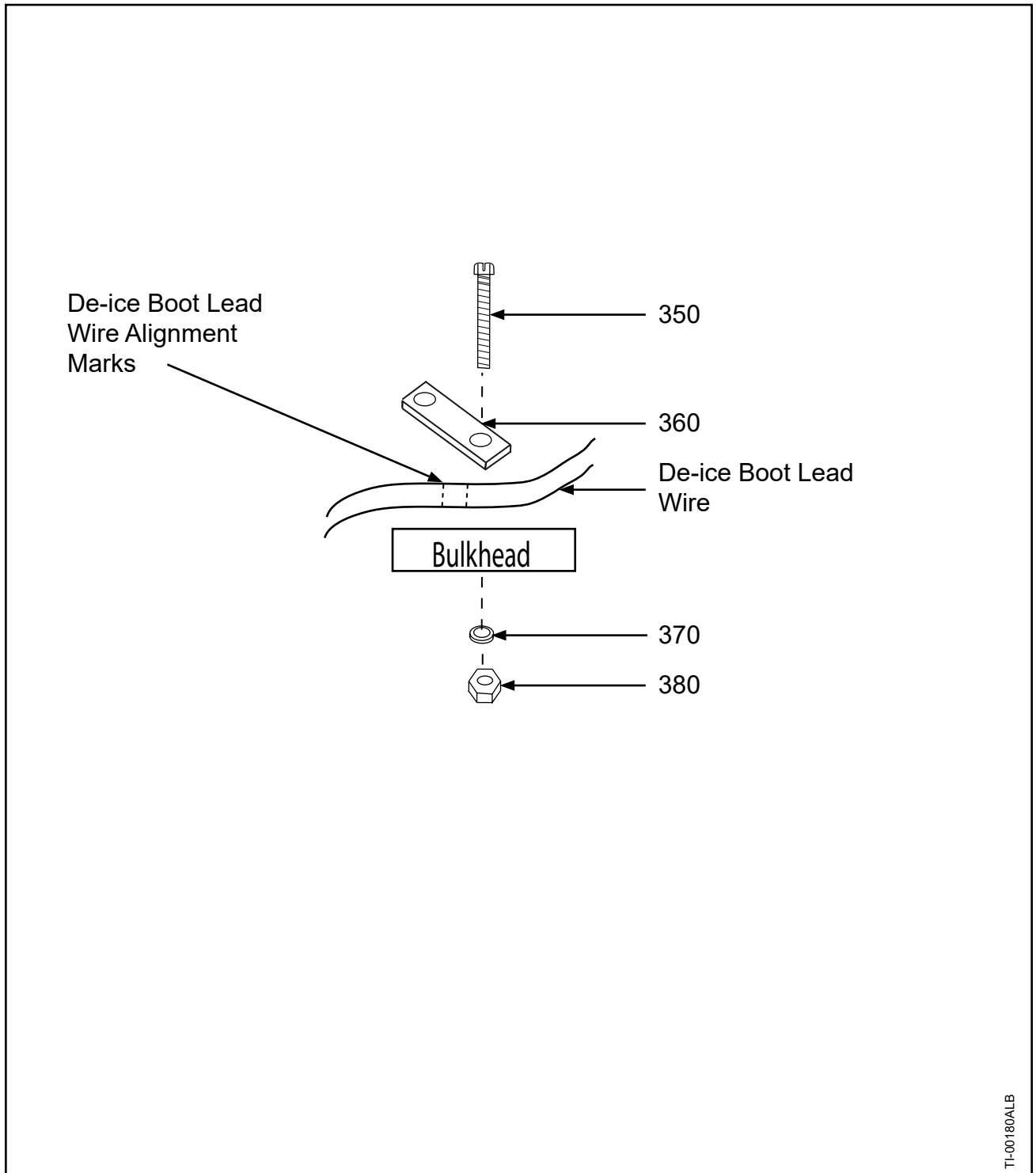
TI-18017

**De-ice Boot Lead Wire Tie Straps  
Figure DS-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**104267**



**Lead Clip to Bulkhead  
Figure DS-2**

TI-00180ALB

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**104267**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>104267</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11DS</b> <b>FIGURES: DS-1 and DS-2</b>		
350	B-6637-30	• SCREW, PAN HEAD, CRES	6	
360	3H1271-2	• CLIP, LEAD STRAP	3	
370	B-3837-N632	• WASHER, CORROSION RESISTANT	6	Y
380	B-6655-06	• NUT, HEX, SELF-LOCKING	6	Y
930	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	2	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 104267**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**104876**

DT. Installation Instruction 11DT

- (1) Using the screws (1170), attach the slip ring (1140) and the bulkhead to the hub as shown in Figure DT-1.
  - (a) Torque each screw (1170) 96-120 In-Lbs (10.1-13.5 N•m).
  - (b) Perform slip ring run-out check in accordance with the Check chapter in this manual.

NOTE: Screws (1170) are used for assembly only. Bolts (1170A) and washers (1180) are used for installation on the aircraft.

- (2) Position the propeller blades at reverse blade angle.
- (3) Assemble the plug connection between the wire harness (890) and the de-ice boot.
- (4) Install the tie strap (930) around the wire harness/de-ice boot plug connection.
- (5) Position the tie strap head (930) in approximate location shown in Figure DT-2.
- (6) Route the terminal end of the wire harness (890) through the hole in counterweight rib, as shown in Figure DT-2.
- (7) Secure the wire harness/boot connection to the counterweight.
  - (a) Install tie straps (910) under the tie strap (930) connecting the wire harness/boot plugs, and around the counterweight as shown in Figure DT-2.
  - (b) Position the tie strap head in the approximate location on the side of the counterweight as shown in Figure DT-2. Snug but do not tighten the tie straps (910) at this time.
- (8) Make sure that the wire harness (890) is taut through the counterweight hole.
- (9) Secure the wire harness (890) to the counterweight by installing the tie strap (930) through the counterweight hole and around the wire harness (890) on both sides of the counterweight. Position the head of the tie strap (930) in the approximate location shown in Figure DT-2.
- (10) Tighten all of the tie straps (910 and 930).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**104876**

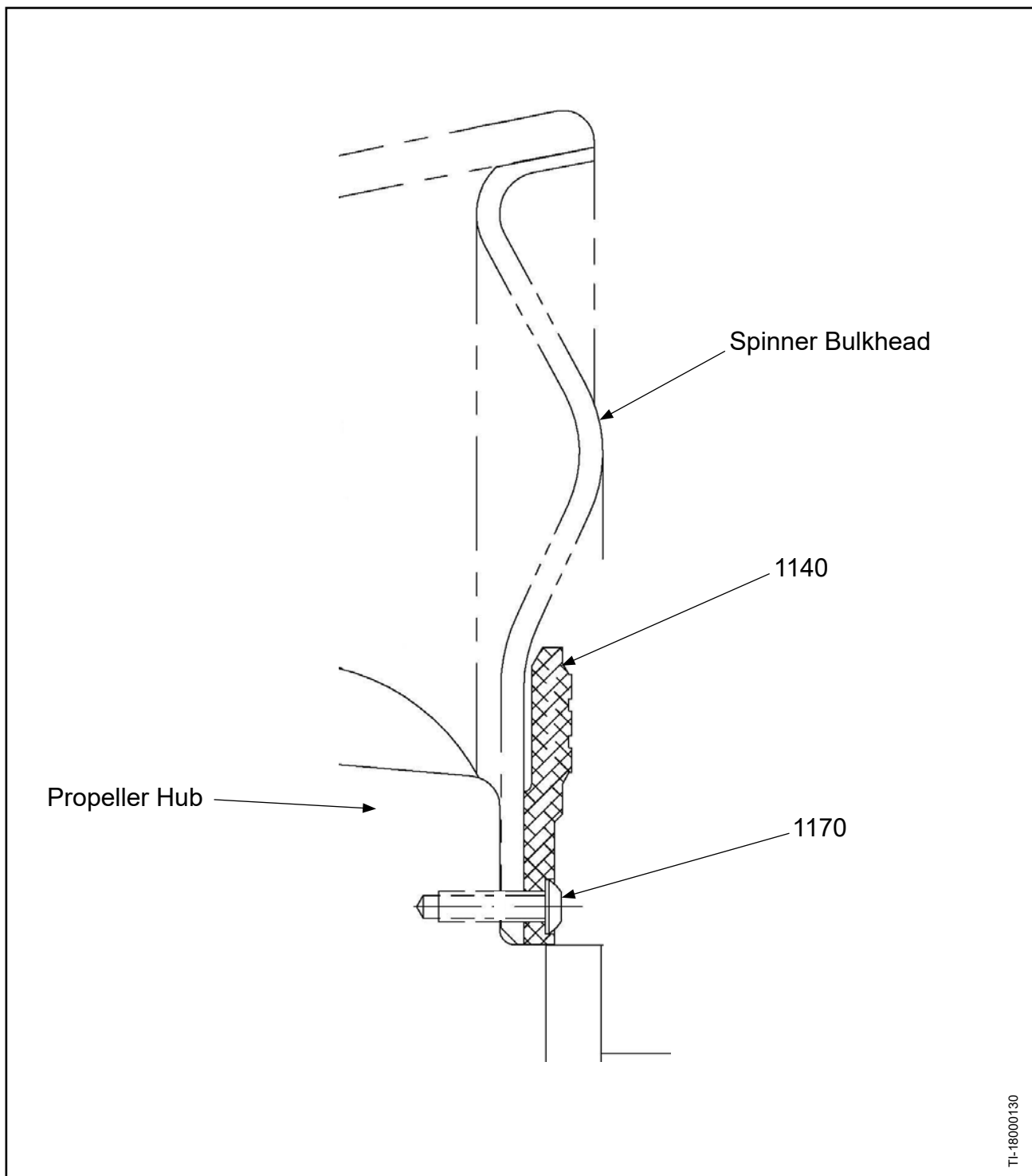
DT. Installation Instruction 11DT - continued

- (11) Using the screw (220), washers (200 and/or 210), and nut (190), attach the terminal strip (170) to the bulkhead in accordance with Figure DT-3 and Figure DT-4.
  - (a) Torque the screw (220) to 10-12 In-Lbs (1.1-1.3 N•m).
- (12) Install the slip ring lead wires and de-ice wire harness (890) to the terminal strip (170) in accordance with Figure DT-5.
  - (a) Tighten the terminal screws until snug.
- (13) Install the clamp (590), around the wire harness (890) as shown in Figure DT-4 and Figure DT-6.
- (14) Using the screw (610), washers (620 and/or 630), and nut (600), attach the clamp (590) to the bulkhead in accordance with Figure DT-7.
  - (a) Position the centerline of the clamp (590) parallel to terminal strip (170) as shown in Figure DT-6.
  - (b) Torque the screw (610) to 22-25 In-Lbs (2.48-2.82 N•m)
- (15) At installation of the propeller on the aircraft:
  - (a) Remove screws (1170) and replace with bolts (1170A) and washers (1180) in accordance with the aircraft manufacturer's instructions.
  - (b) Apply A-6741-118 anti-sieze compound (MIL-PRF-83483) to threads of bolt (1170A).
  - (c) Install bolt (1170A) and washer (1880).
  - (d) Torque bolt (1170A) 36 - 44 In-Lbs. (48.8 - 59.6 M•m).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

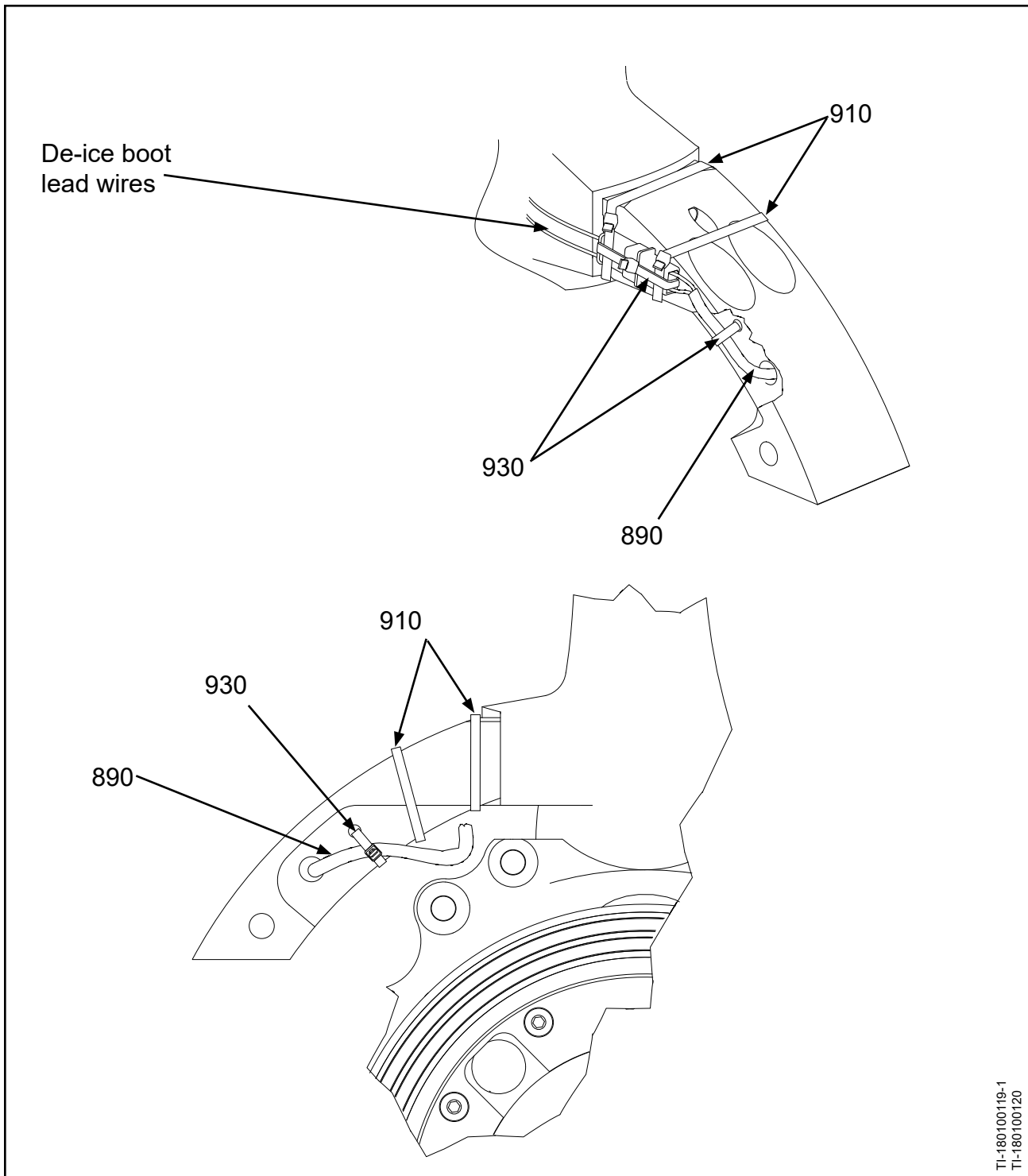
**104876**



**Slip Ring Mounting  
Figure DT-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

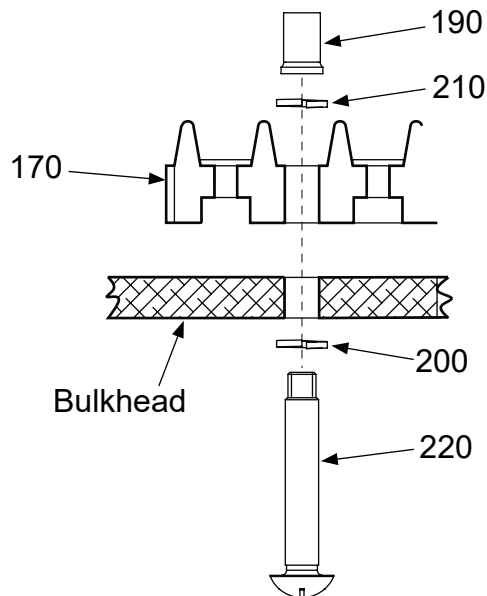
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**104876**



**Wire Harness to Counterweight  
Figure DT-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**104876**

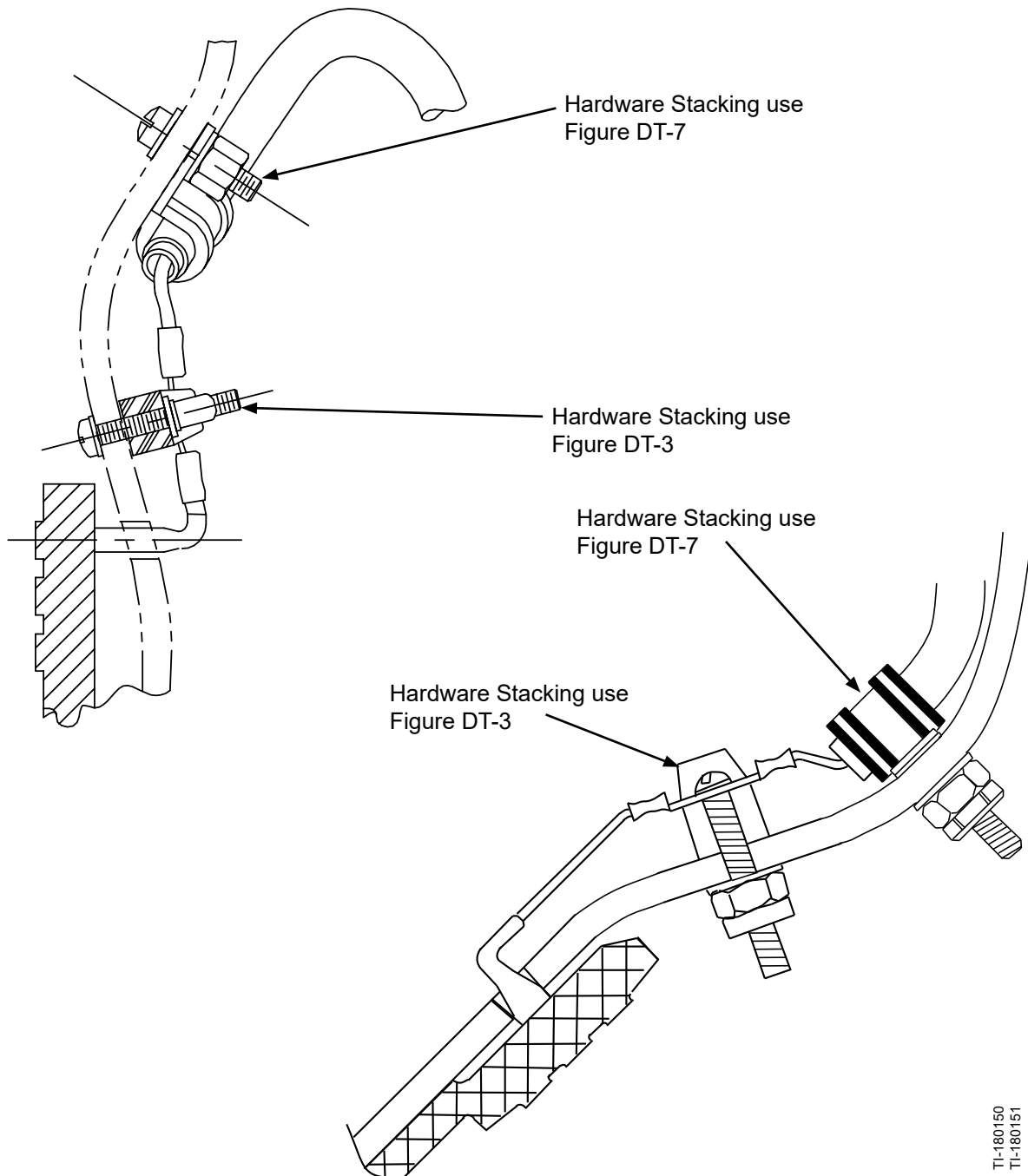


TP1-MB-0136

**Terminal Strip Hardware Configuration: Bulkhead Mounted  
Figure DT-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**104876**

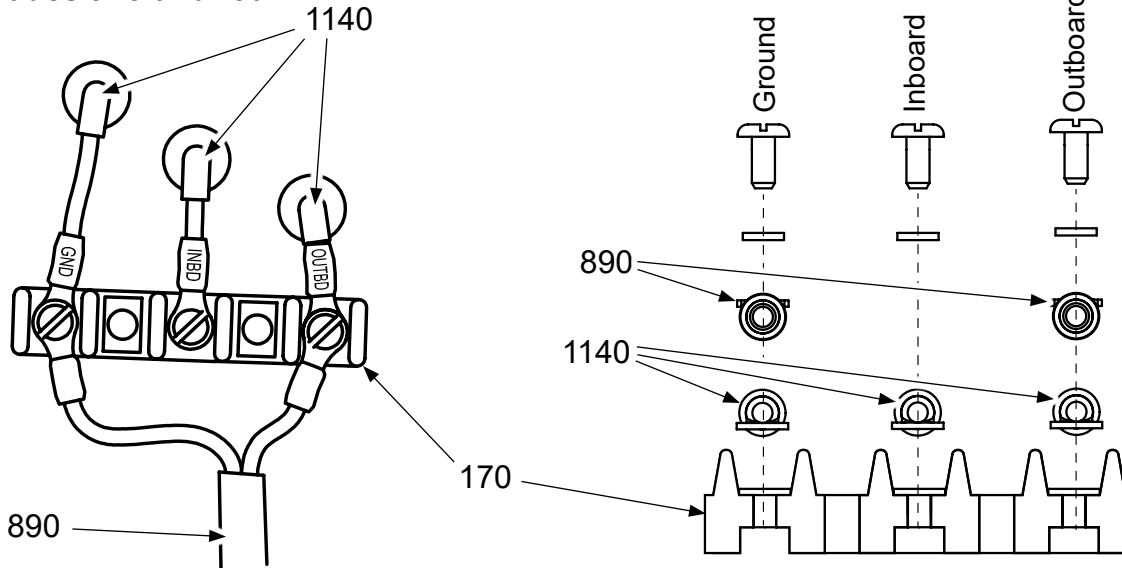


**Terminal Strip and Loop Clamp to Bulkhead Attachment  
Figure DT-4**

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

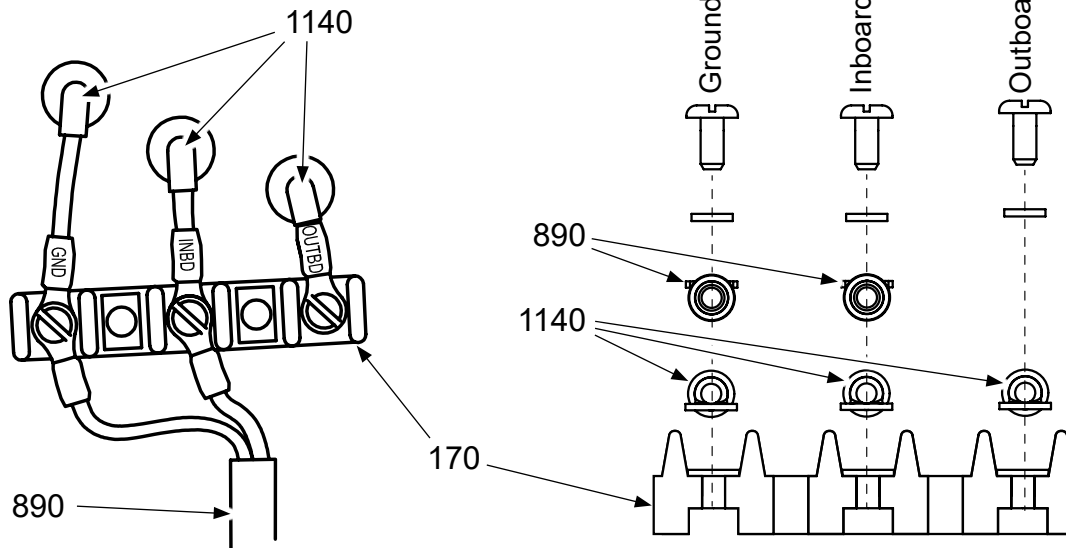
This section includes the parts list(s) and installation instructions for the following electric de-ice kit(s):  
**104876**

## Blades two and four



**NOTE:** The illustrations show slip ring wires on a typical right-hand (rotation) propeller.

## Blades one and three

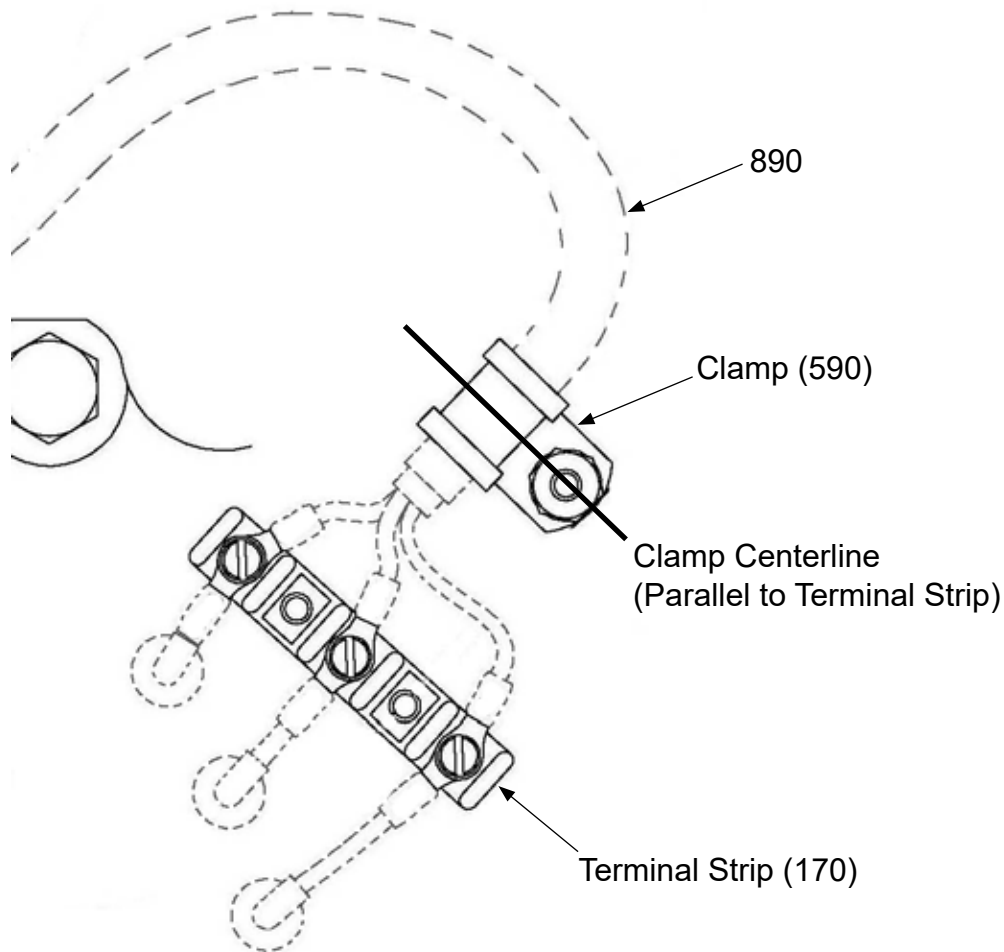


## Crossfire Configuration A

**Terminal Strip Lead Wire Configurations: Bulkhead Mounted  
Figure DT-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**104876**



**NOTE:** This figure illustrates the orientation of the clamp to the terminal strip.  
Wire harness/slip ring wires are shown for reference only.  
Actual wire harness may have two or three wires.

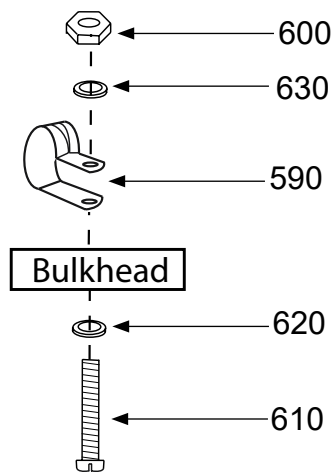
TPL-MB-0310

**Loop Clamp Orientation  
Figure DT-6**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**104876**



TI-00180AC

**Loop Clamp to Bulkhead Hardware Configuration  
Figure DT-7**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**104876**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>104876</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>SUPERSEDED BY 106309, POST HC-SB-30-366</b> <b>INSTALLATION INSTRUCTION 11DT</b> <b>FIGURES DT-1 thru DT-7</b>		
170	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM	4	
190	2H1365	• TAPPED EYELET	8	Y
200	B-3854-41	• WASHER, LOCK	8	Y
210	B-3854-41	• WASHER, LOCK	8	Y
220	B-6637-34	• SCREW, PAN HEAD	8	Y
590	B-6735	• CLAMP, LOOP, CUSHIONED	4	Y
600	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
610	B-3856-248	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
620	B-3854-42	• WASHER, LOCK	4	Y
630	B-3837-N832	• WASHER, CRESCENT	4	Y
890	3H2383-4	• DE-ICE WIRE HARNESS	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	8	Y
1140	4H2661-1	• SLIP RING ASSEMBLY	1	
1170	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	8	Y
1170A	B-3384-9H	• BOLT, 1/4-28, HEX HEAD	8	Y
1180	B-3851-0432	• WASHER	8	Y
		<u>NOTE:</u> USE ITEM 1170 DURING ASSEMBLY. USE ITEMS 1170A AND 1180 WHEN PROPELLER IS INSTALLED ON THE AIRCRAFT.		

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 104876**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106138, 106146, 106308, 106309, 107626, 109306**

**DU. Installation Instruction 11DU**

- (1) Attach the slip ring (1140), the aircraft manufacturer's pulley set (if applicable), and the bulkhead to the hub in accordance with the applicable configuration shown in Figure DU-1.
  - (a) Torque each bolt/screw (1205) 8 - 10 Ft-Lbs (10.8-13.5 N•m).
  - (b) Perform a slip ring run-out check in accordance with the Check chapter in this manual.
- (2) Using screw (220), washers (200 and 210), and tapped eyelet (190), attach the terminal strip (170) to the bulkhead in accordance with Figure DU-2.
  - (a) Torque the screws (220) to 10-12 In-Lb (1.12-1.35 N•m).
- (3) Install a hex bolt (1315) through the hub on the counterweight-side of all four blades as shown in Figure DU-3.
- (4) Install the wire harness bracket (1300).
  - (a) Install one washer (1305), one washer (1310), one wire harness bracket (1300), the existing hub washer, and the existing hub clamping nut onto the hex bolt (1315) in accordance with Figure DU-4.
  - (b) Position the wire harness bracket (1300) so that the long edge of the bracket is parallel with the blade centerline as shown in Figure DU-3.
  - (c) Torque the hub clamping nut (dry) to 20 - 24 Ft-Lbs (27 - 33 N•m).
- (5) Move the propeller blades to reverse or low blade angle.
- (6) Assemble the plug connection between the wire harness (890) and the de-ice boot.
  - (a) Install one tie strap (930) around the wire harness/de-ice boot plug connection in accordance with Figure DU-5, but do not tighten the tie strap at this time.
- (7) Route the terminal ends of the wire harness (890) through the hole in the counterweight as shown in Figure DU-5.
- (8) Secure the wire harness/boot plug connection to the counterweight.
  - (a) Position the O-ring on the wire harness (890) at the edge of the counterweight as shown in Figure DU-5.
  - (b) Install two tie straps (910) under the tie strap (930) connecting the wire harness/boot plugs, and around the counterweight and over the wire harness shrink tubing as shown in Figure DU-5.
  - (c) Position the tie strap heads in the approximate location shown in Figure DU-5, then tighten the tie straps (910 and 930).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106138, 106146, 106308, 106309, 107626, 109306**

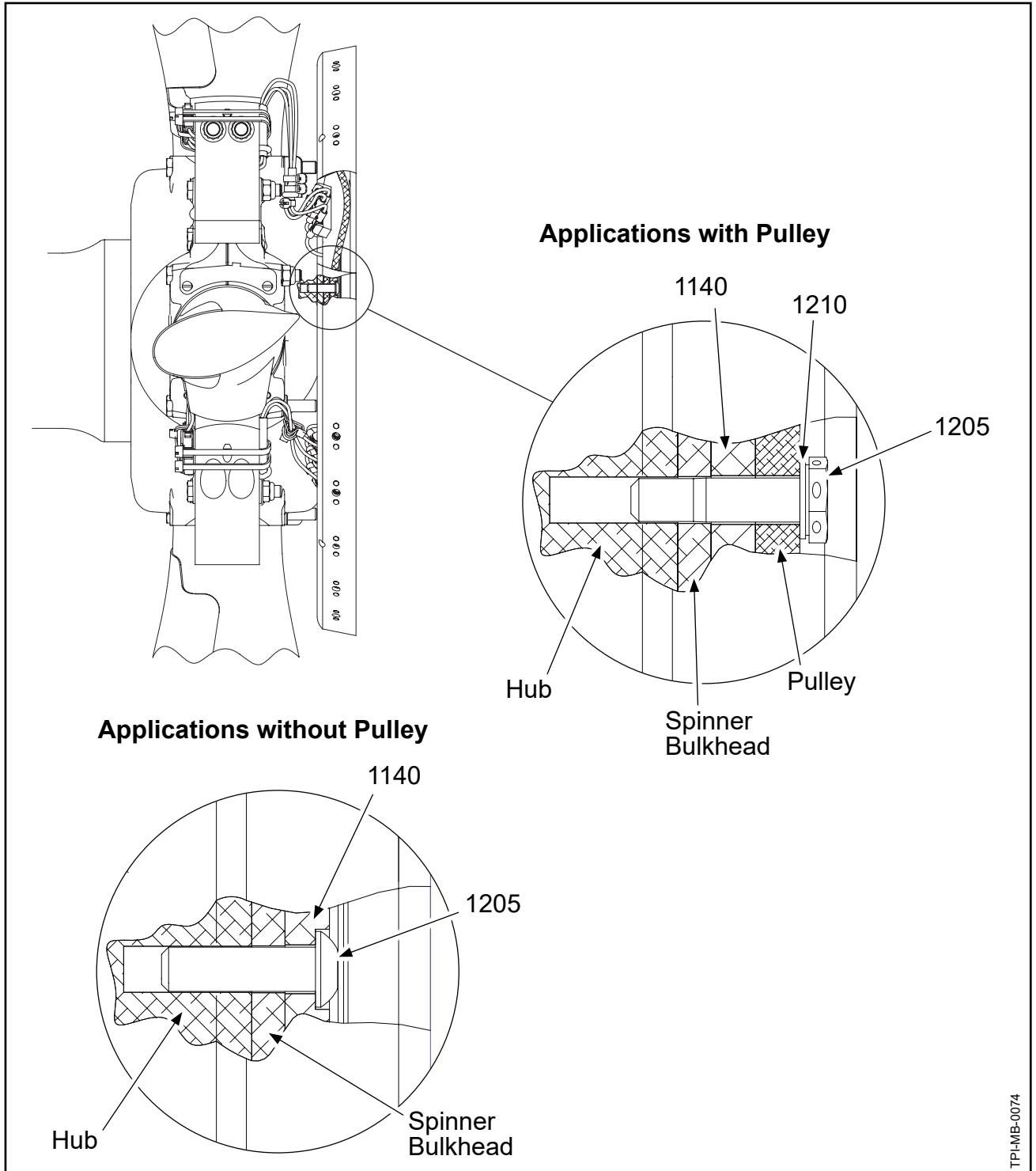
**DU. Installation Instruction 11DU - continued**

- (d) Install one tie strap (930) through the small hole in the counterweight, under the counterweight, and around the clear tubing on the wire harness (890) as shown in Figure DU-5.
  - 1 Make sure the tie strap (930) is over the clear tubing of the wire harness (890) on both sides of the counterweight.
- (9) Install one tie strap (940) around the wire harness (890) below the O-ring at the terminal-end of the harness as shown in Figure DU-6.
- (10) Secure the wire harness (890) to the wire harness bracket (1300).
  - (a) Position the O-ring/shrink tubing on the terminal-end of the wire harness (890) so that the O-ring is at the bottom of the wire harness bracket (1300) as shown in Figure DU-7.
    - 1 Be sure the lead wires are not twisted or bent sharply.
  - (b) Install and tighten two tie straps (840) around the wire harness bracket (1300) and the shrink tubing on the wire harness (890) as shown in Figure DU-7.
    - 1 Position the tie straps (840) in the grooves on the wire harness bracket (1300) as shown in Figure DU-7.
    - 2 Position the heads of the tie straps as shown in Figure DU-7.
- (11) Attach the lead wires from the wire harness (890) and the slip ring lead wires to the terminal strip (170) in accordance with the applicable configuration below:
  - (a) 106138: Crossfire Configuration B - Refer to Figure DU-9
  - (b) 106146 [*Installed on Korean Aerospace Industries Ltd. KO-1 and KT-1 Only*]: Crossfire Configuration B - Refer to Figure DU-9
  - (c) 106146 [*Installed on Northwest Turbines LLC, Beech B60 Only*]: Typical 3-Wire Configuration - Refer to Figure DU-10
  - (d) 106308: Crossfire Configuration A - Refer to Figure DU-8
  - (e) 106309: Crossfire Configuration A - Refer to Figure DU-8
  - (f) 107626: Crossfire Configuration A - Refer to Figure DU-8
  - (g) 109306: Typical 3-Wire Configuration - Refer to Figure DU-10
- (12) Tighten the screws on the terminal strip (170) until snug.
- (13) Cycle the propeller from low angle to high angle to verify correct wire harness installation. Make sure the wire harness is not blocked during cycling.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106138, 106146, 106308, 106309, 107626, 109306**



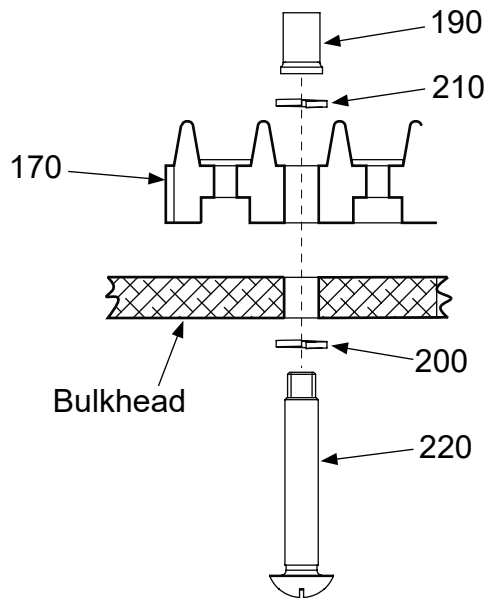
**Slip Ring Mounting  
Figure DU-1**

TPI-MB-0074

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106138, 106146, 106308, 106309, 107626, 109306**



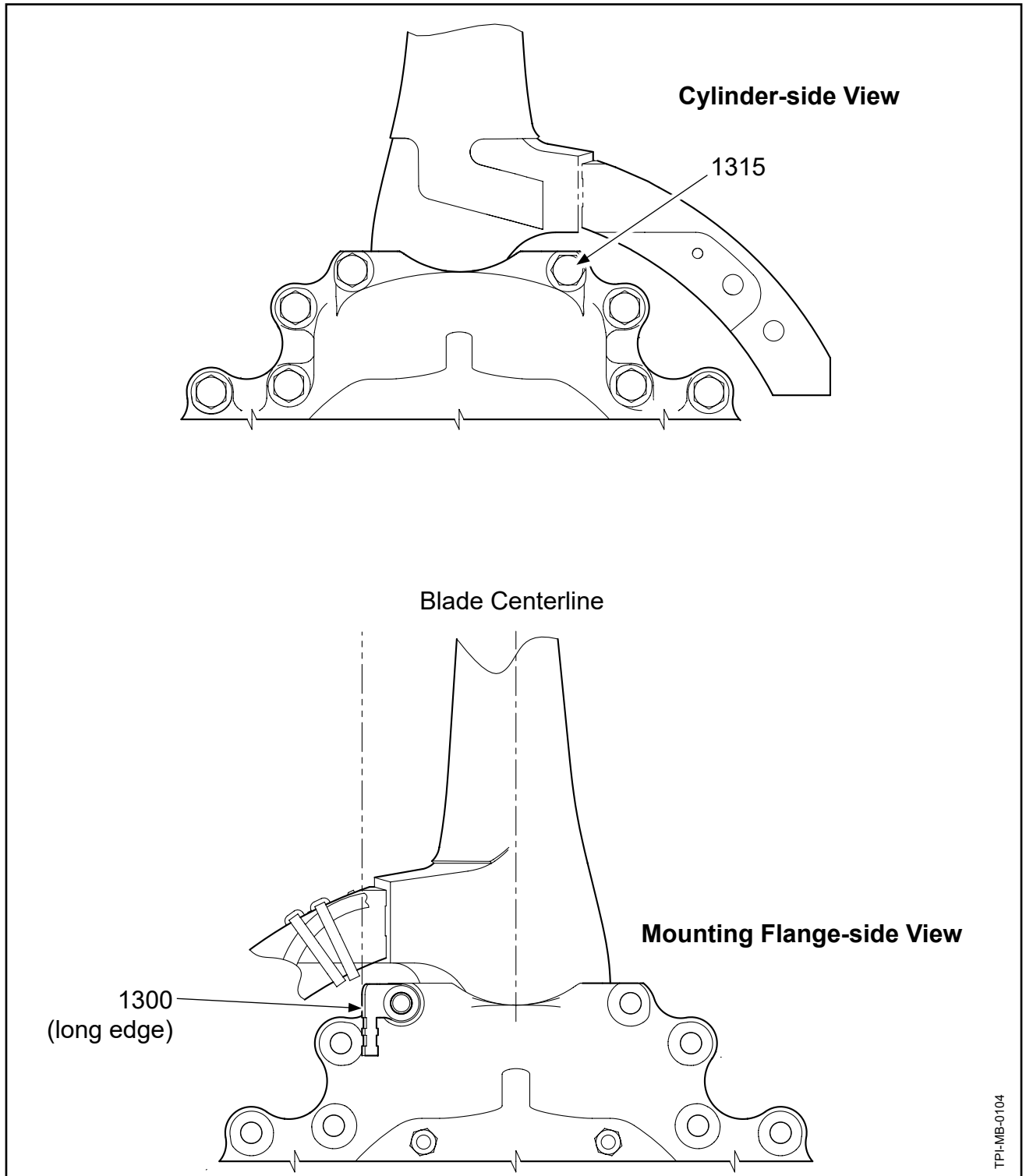
TP1-MB-0136

**Terminal Strip Hardware Configuration: Bulkhead Mounted  
Figure DU-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106138, 106146, 106308, 106309, 107626, 109306**

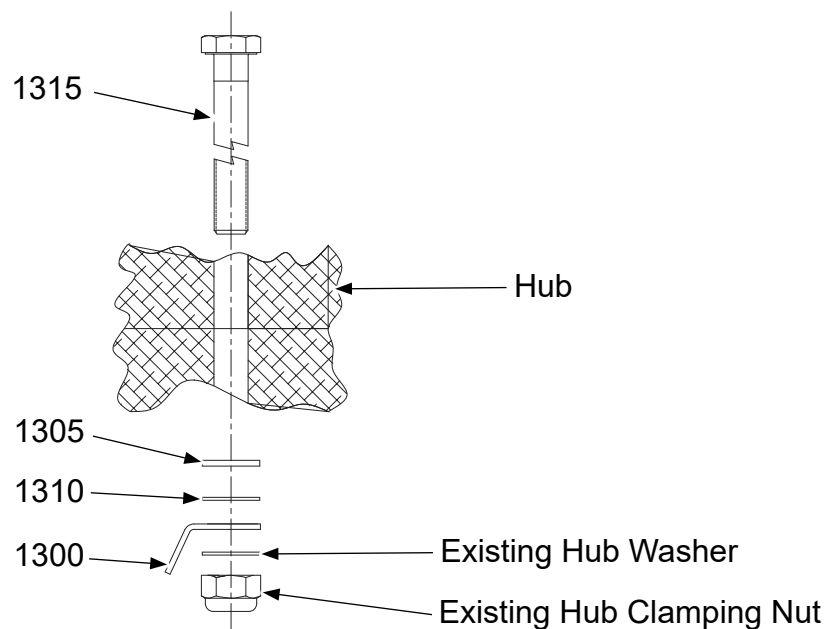


**Hub Clamping Bolt Replacement and De-ice Bracket Alignment  
Figure DU-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106138, 106146, 106308, 106309, 107626, 109306**



TPHMB-0087-

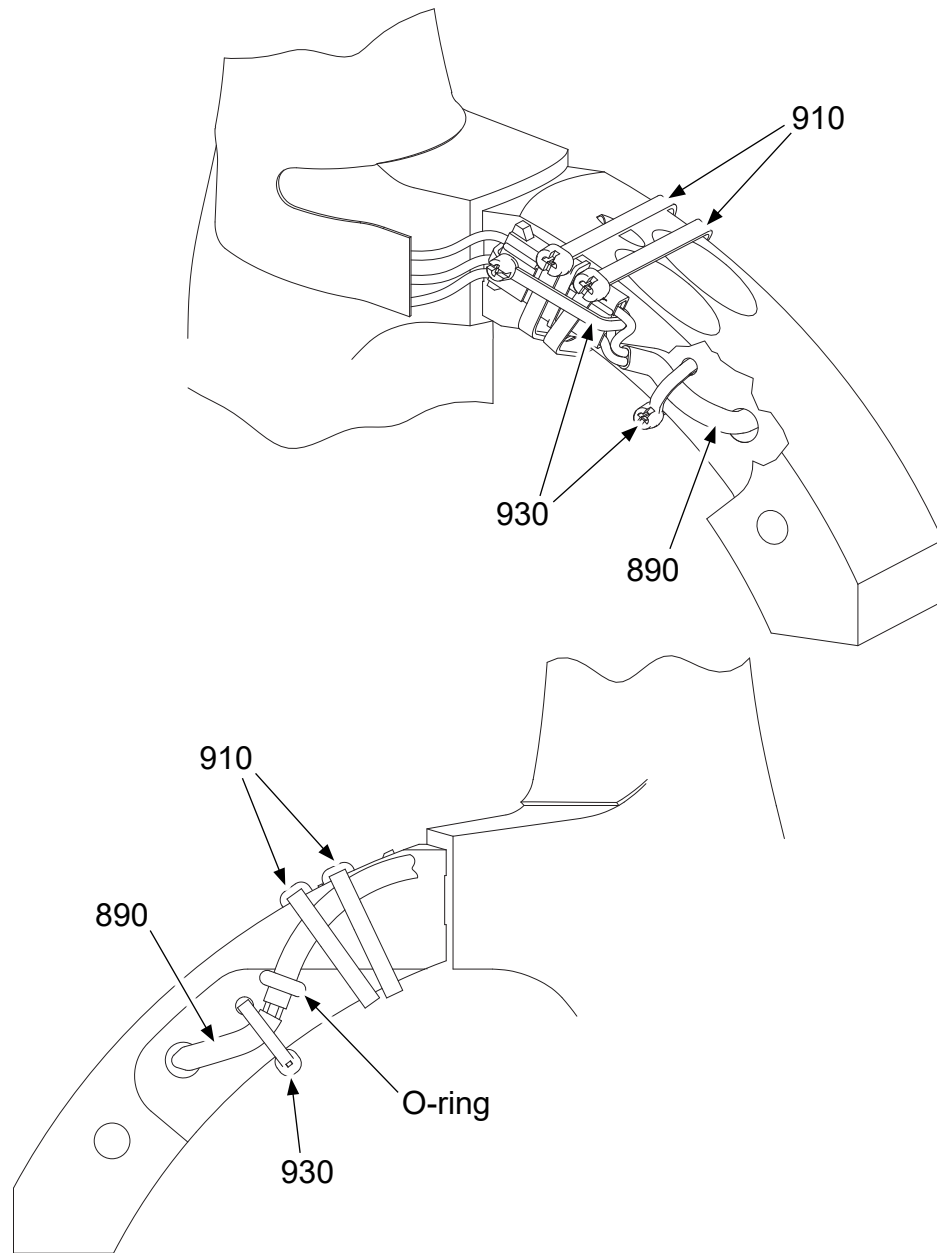
**Wire Harness Bracket Hardware Configuration  
Figure DU-4**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106138, 106146, 106308, 106309, 107626, 109306**



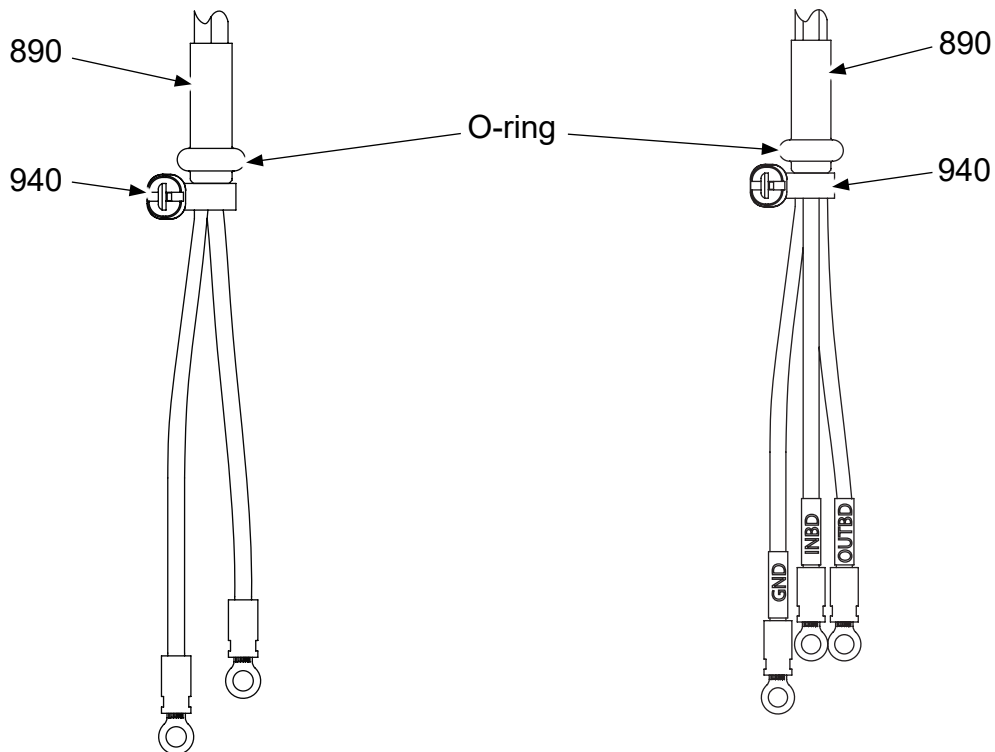
**Wire Harness to Counterweight  
Figure DU-5**

TP1-MB-0084

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106138, 106146, 106308, 106309, 107626, 109306**



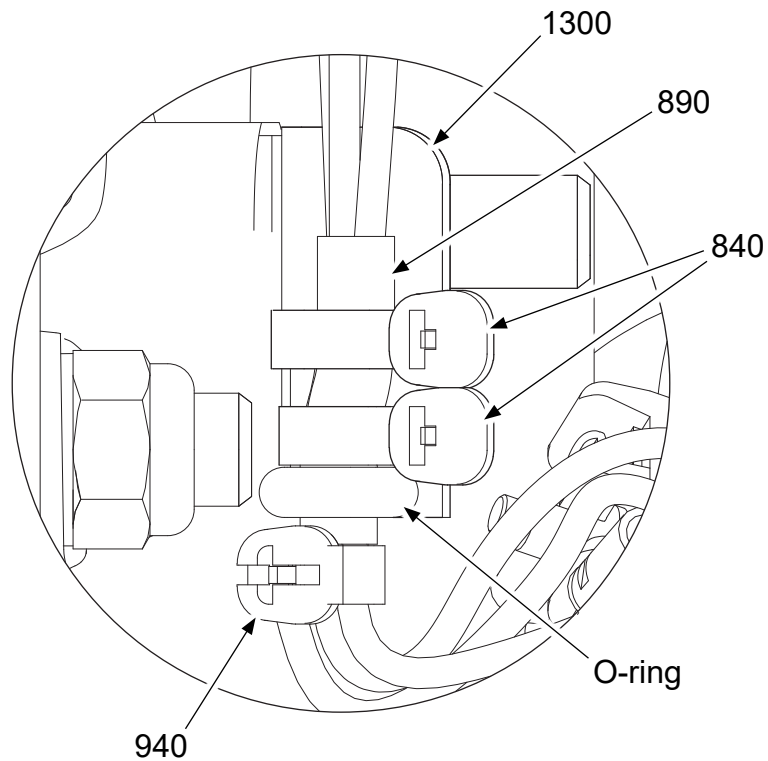
TPI-MB-0130

**Wire Harness Tie Strap Location  
Figure DU-6**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106138, 106146, 106308, 106309, 107626, 109306**



TPL-MB-0088

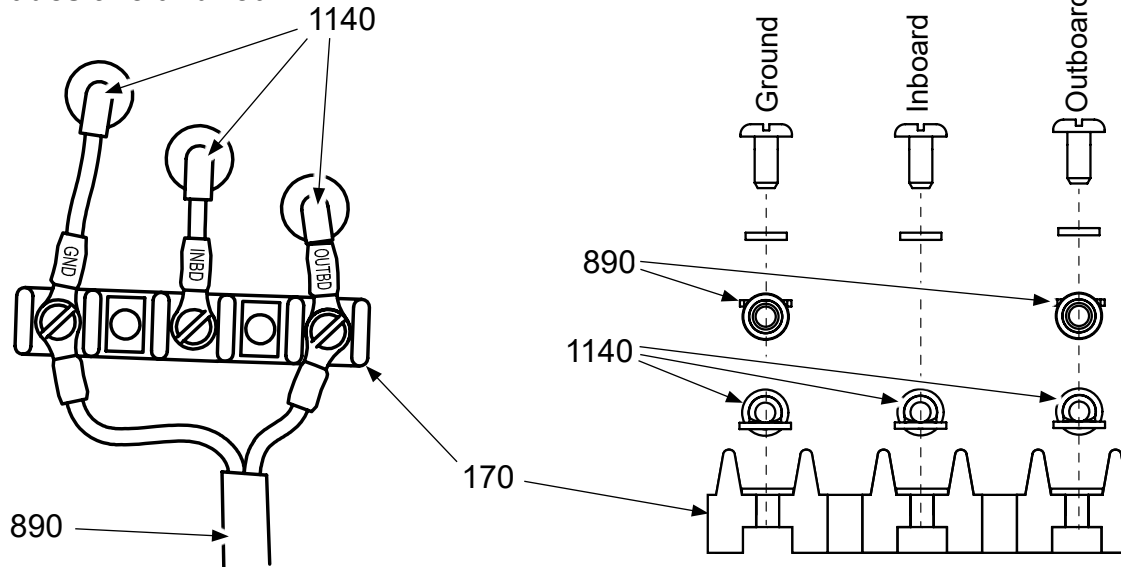
**Wire Harness to De-ice Bracket  
Figure DU-7**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

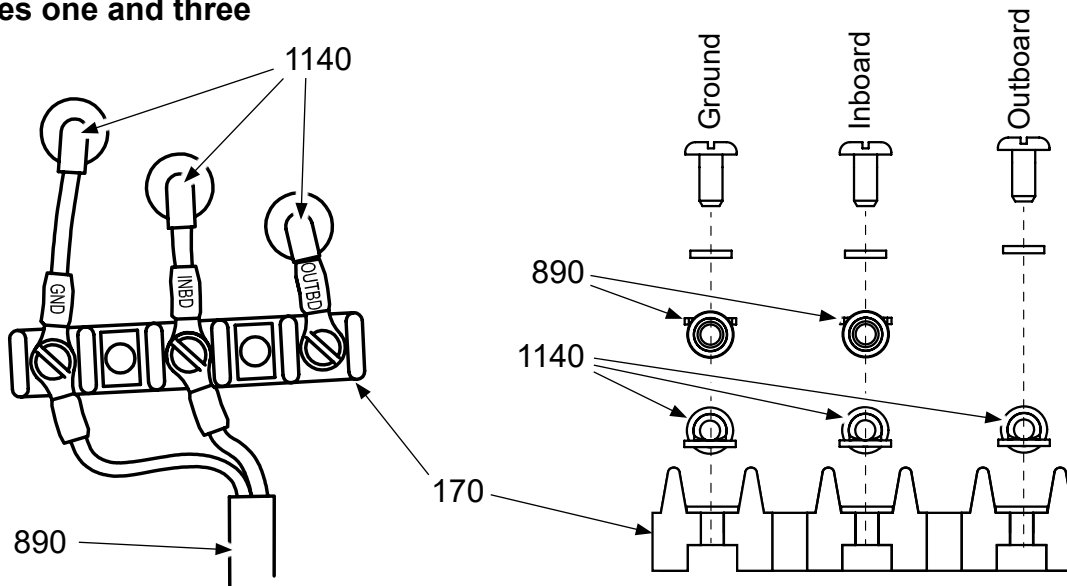
**106138, 106146, 106308, 106309, 107626, 109306**

**Blades two and four**



**NOTE:** The illustrations show slip ring wires on a typical right-hand (rotation) propeller.

**Blades one and three**



TP1-MB-0133

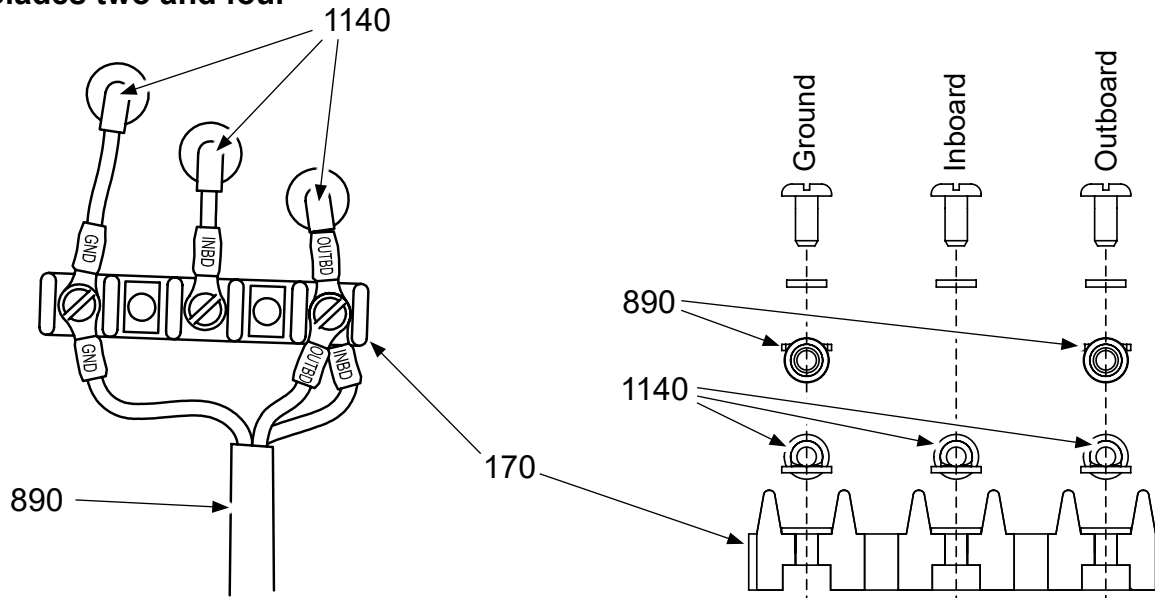
**Terminal Strip Lead Wires: Crossfire Configuration A  
Figure DU-8**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

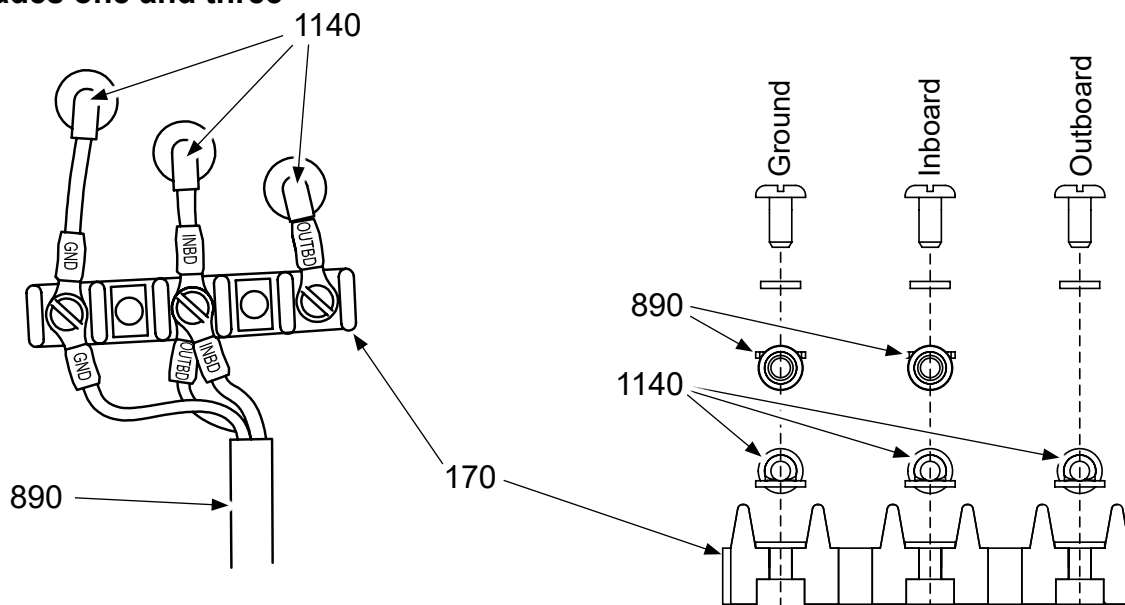
**106138, 106146, 106308, 106309, 107626, 109306**

**Blades two and four**



**NOTE:** The illustrations show slip ring wires on a typical right-hand (rotation) propeller.

**Blades one and three**



TPI-MB-0131

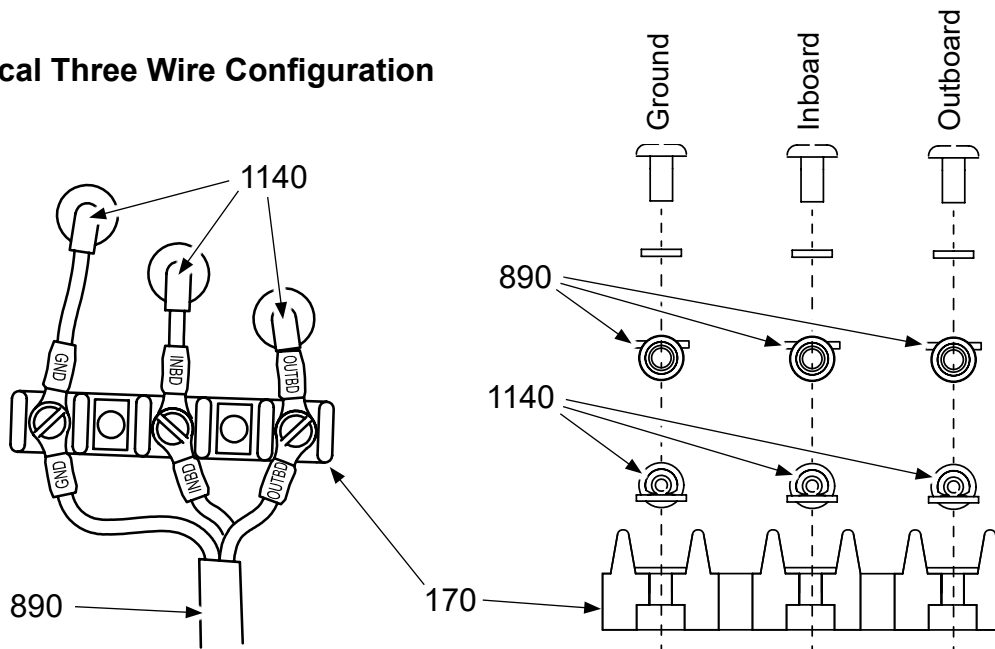
**Terminal Strip Lead Wires: Crossfire Configuration B  
Figure DU-9**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106138, 106146, 106308, 106309, 107626, 109306**

**Typical Three Wire Configuration**



**NOTE:** The illustrations show slip ring wires on a typical right-hand (rotation) propeller.

TPI-MB-0134

**Terminal Strip Lead Wires: Typical 3-Wire Configuration  
Figure DU-10**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106138, 106146, 106308, 106309, 107626, 109306**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>106138</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11DU</b> <b>FIGURES: DU-1 thru DU-7, and DU-9</b>		
170	1H1150-2	• TERMINAL STRIP	4	
190	2H1365	• TAPPED EYELET	8	Y
200	B-3854-41	• WASHER, LOCK	8	Y
210	B-3854-41	• WASHER, LOCK	8	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	8	Y
1140	4H2661-4	• SLIP RING ASSEMBLY	1	
1205	B-3384-9H	• BOLT, 1/4-28, HEX HEAD	8	Y
1210	B-3851-0432	• WASHER	8	Y
840	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
1300	B-6265	• BRACKET, WIRE HARNESS	4	
1315	102691	• BOLT, 3/8-24, HEX HEAD	4	
1305	B-3834-0663	• WASHER	4	Y
1310	B-3834-0632	• WASHER	4	Y
890	106129	• WIRE HARNESS	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	8	Y
940	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	4	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 106138**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106138, 106146, 106308, 106309, 107626, 109306**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>106146</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLED ON KOREAN AEROSPACE INDUSTRIES LTD. KO-1 AND KT-1 ONLY INSTALLATION INSTRUCTION 11DU FIGURES: DU-1 thru DU-7, and DU-9</b>		
170	1H1150-2	• TERMINAL STRIP	4	
190	2H1365	• TAPPED EYELET	8	Y
200	B-3854-41	• WASHER, LOCK	8	Y
210	B-3854-41	• WASHER, LOCK	8	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	8	Y
1140	4H2661-1	• SLIP RING ASSEMBLY	1	
1205	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	8	Y
840	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
1300	B-6265	• BRACKET, WIRE HARNESS	4	
1315	102691	• BOLT, 3/8-24, HEX HEAD	4	
1305	B-3834-0663	• WASHER	4	Y
1310	B-3834-0632	• WASHER	4	Y
890	106129	• WIRE HARNESS	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	8	Y
940	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	4	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 106146**  
**(Installed on Korean Aerospace Industries Ltd. KO-1 and KT-1 Only)**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106138, 106146, 106308, 106309, 107626, 109306**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>106146</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLED ON NORTHWEST TURBINES LLC,</b> <b>BEECH B60 ONLY</b> <b>INSTALLATION INSTRUCTION 11DU</b> <b>FIGURES: DU-1 thru DU-7, and DU-10</b>		
170	1H1150-2	• TERMINAL STRIP	4	
190	2H1365	• TAPPED EYELET	8	Y
200	B-3854-41	• WASHER, LOCK	8	Y
210	B-3854-41	• WASHER, LOCK	8	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	8	Y
1140	4H2661-1	• SLIP RING ASSEMBLY	1	
1205	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	8	Y
840	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
1300	B-6265	• BRACKET, WIRE HARNESS	4	
1315	102691	• BOLT, 3/8-24, HEX HEAD	4	
1305	B-3834-0663	• WASHER	4	Y
1310	B-3834-0632	• WASHER	4	Y
890	106129	• WIRE HARNESS	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	8	Y
940	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	4	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 106146**  
**(Installed on Northwest Turbines LLC, Beech B60 Only)**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106138, 106146, 106308, 106309, 107626, 109306**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>106308</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11DU</b> <b>FIGURES: DU-1 thru DU-8</b>		
170	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM	4	
190	2H1365	• TAPPED EYELET	8	Y
200	B-3854-41	• WASHER, LOCK	8	Y
210	B-3854-41	• WASHER, LOCK	8	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	8	Y
840	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
1300	B-6265	• BRACKET, WIRE HARNESS	4	
1315	102691	• BOLT, 3/8-24, HEX HEAD	4	
1305	B-3834-0663	• WASHER	4	Y
1310	B-3834-0632	• WASHER	4	Y
890	106278	• WIRE HARNESS	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	8	Y
940	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	4	
1140	4H2661-1	• SLIP RING ASSEMBLY	1	
1205	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	8	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 106308**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106138, 106146, 106308, 106309, 107626, 109306**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>106309</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11DU</b> <b>FIGURES: DU-1 thru DU-8</b>		
170	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM	4	
190	2H1365	• TAPPED EYELET	8	Y
200	B-3854-41	• WASHER, LOCK	8	Y
210	B-3854-41	• WASHER, LOCK	8	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	8	Y
840	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
1300	B-6265	• BRACKET, WIRE HARNESS	4	
1315	102691	• BOLT, 3/8-24, HEX HEAD	4	
1305	B-3834-0663	• WASHER	4	Y
1310	B-3834-0632	• WASHER	4	Y
890	106278	• WIRE HARNESS	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	8	Y
940	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	4	Y
1140	4H2661-4	• SLIP RING ASSEMBLY	1	
1205	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	8	Y
1205A	B-3384-9H	• BOLT, 1/8-28, HEX HEAD (USED WHEN PULLEY IS INSTALLED)	8	Y
1210	B-3851-0432	• WASHER (USED WHEN PULLEY IS INSTALLED)	8	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 106309**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106138, 106146, 106308, 106309, 107626, 109306**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>107626</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11DU</b> <b>FIGURES: DU-1 thru DU-8</b>		
170	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM	4	
190	2H1365	• TAPPED EYELET	8	Y
200	B-3854-41	• WASHER, LOCK	8	Y
210	B-3854-41	• WASHER, LOCK	8	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	8	Y
840	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
1300	B-6265	• BRACKET, WIRE HARNESS	4	
1315	102691	• BOLT, 3/8-24, HEX HEAD	4	
1305	B-3834-0663	• WASHER	4	Y
1310	B-3834-0632	• WASHER	4	Y
890	106278	• WIRE HARNESS	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	8	Y
940	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	4	Y
1140	106556	• SLIP RING ASSEMBLY	1	
1205	A-2070-11	• SCREW, 1/4-28, BUTTON HEAD	8	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 107626**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106138, 106146, 106308, 106309, 107626, 109306**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>109306</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11DU</b> <b>FIGURES: DU-1 thru DU-7, and DU-10</b>		
170	1H1150-2	• TERMINAL STRIP	4	
190	2H1365	• TAPPED EYELET	8	Y
200	B-3854-41	• WASHER, LOCK	8	Y
210	B-3854-41	• WASHER, LOCK	8	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	8	Y
1140	4H2661-1	• SLIP RING ASSEMBLY	1	
1205	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	8	Y
840	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
1300	B-6265	• BRACKET, WIRE HARNESS	4	
1315	102691	• BOLT, 3/8-24, HEX HEAD	4	
1305	B-3834-0663	• WASHER	4	Y
1310	B-3834-0632	• WASHER	4	Y
890	108270	• WIRE HARNESS	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	8	Y
940	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	4	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 109306**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106138, 106146, 106308, 106309, 107626, 109306**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106298, 106299, and 109545**

**DV.**    Installation Instruction 11DV

- (1) Attach the slip ring (1140), the aircraft manufacturer's pulley set (if applicable), and the bulkhead to the hub in accordance with the applicable configuration shown in Figure DV-1.
  - (a) Torque each bolt/screw (1205) 8 - 10 Ft-Lbs (10.8-13.5 N•m).
  - (b) Perform a slip ring run-out check in accordance with the Check chapter in this manual.
- (2) Position the terminal strip (170) on the bulkhead in accordance with Orientation B in Figure DV-2.
- (3) Using screw (220), washers (200 and 210), and tapped eyelet (190), attach the terminal strip (170) to the bulkhead in accordance with Figure DV-2.
  - (a) Torque the screws (220) to 10-12 In-Lb (1.12-1.35 N•m).
- (4) Install a hex bolt (1315) through the hub on the counterweight-side of all four blades as shown in Figure DV-3.
- (5) Install the wire harness bracket (1300).
  - (a) Install one washer (1305), one washer (1310), one wire harness bracket (1300), the existing hub washer, and the existing hub clamping nut onto the hex bolt (1315) in accordance with Figure DV-4.
  - (b) Position the wire harness bracket (1300) so that the long edge of the bracket is parallel with the blade centerline as shown in Figure DV-3.
  - (c) Torque the hub clamping nut (dry) to 20 - 24 Ft-Lbs (27 - 33 N•m).
- (6) Move the propeller blades to reverse or low blade angle.
- (7) Assemble the plug connection between the wire harness (890) and the de-ice boot.
  - (a) Install one tie strap (930) around the wire harness/de-ice boot plug connection in accordance with Figure DV-5, but do not tighten the tie strap at this time.
- (8) Route the terminal ends of the wire harness (890) through the hole in the counterweight as shown in Figure DV-5.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106298, 106299, and 109545**

DV. Installation Instruction 11DV - continued

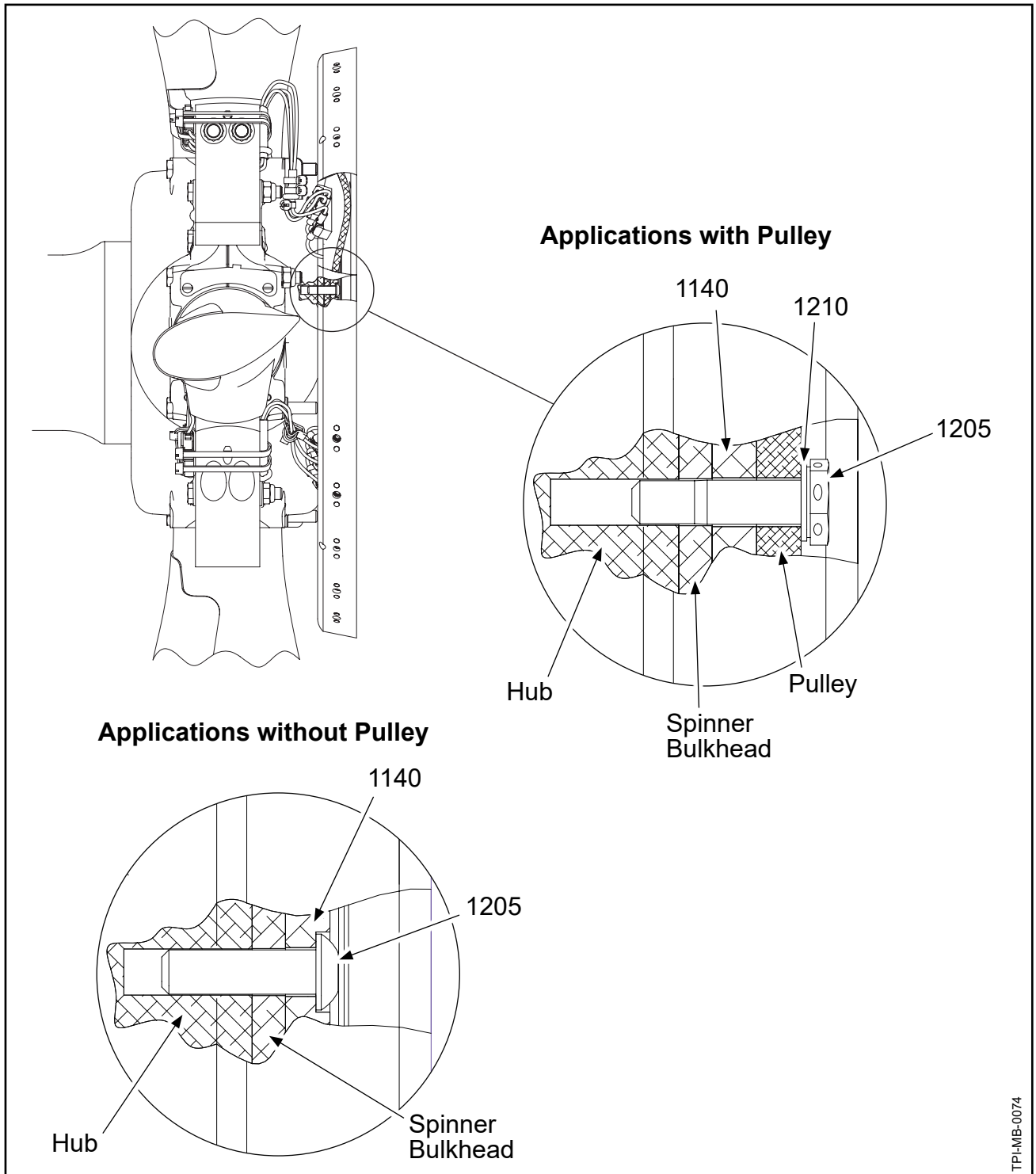
- (8) Secure the wire harness/boot plug connection to the counterweight.
  - (a) Position the O-ring on the wire harness (890) at the edge of the counterweight as shown in Figure DV-5.
  - (b) Install two tie straps (910) under the tie strap (930) connecting the wire harness/boot plugs, and around the counterweight and over the wire harness shrink tubing as shown in Figure DV-5.
  - (c) Position the tie strap heads in the approximate location shown in Figure DV-5, then tighten the tie straps (910 and 930).
  - (d) Install one tie strap (930) through the small hole in the counterweight, under the counterweight, and around the clear tubing on the wire harness (890) as shown in Figure DV-5.
    - 1 Make sure the tie strap (930) is over the clear tubing of the wire harness (890) on both sides of the counterweight.
- (9) Install one tie strap (940) around the wire harness (890) below the O-ring at the terminal-end of the harness as shown in Figure DV-6.
- (10) Secure the wire harness (890) to the wire harness bracket (1300).
  - (a) Position the O-ring/shrink tubing on the terminal-end of the wire harness (890) so that the O-ring is at the bottom of the wire harness bracket (1300) as shown in Figure DV-7.
    - 1 Be sure the lead wires are not twisted or bent sharply.
  - (b) Install and tighten two tie straps (840) around the wire harness bracket (1300) and the shrink tubing on the wire harness (890) as shown in Figure DV-7.
    - 1 Position the tie straps (840) in the grooves on the wire harness bracket (1300) as shown in Figure DV-7.
    - 2 Position the heads of the tie straps as shown in Figure DV-7.
- (11) Attach the lead wires from the wire harness (890) and the slip ring lead wires to the terminal strip in accordance with the applicable configuration shown in Figure DV-8.
  - (a) Tighten the terminal strip screws until snug.
- (12) Cycle the propeller from low angle to high angle to verify correct wire harness installation. Make sure the wire harness is not blocked during cycling.



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106298, 106299, and 109545**

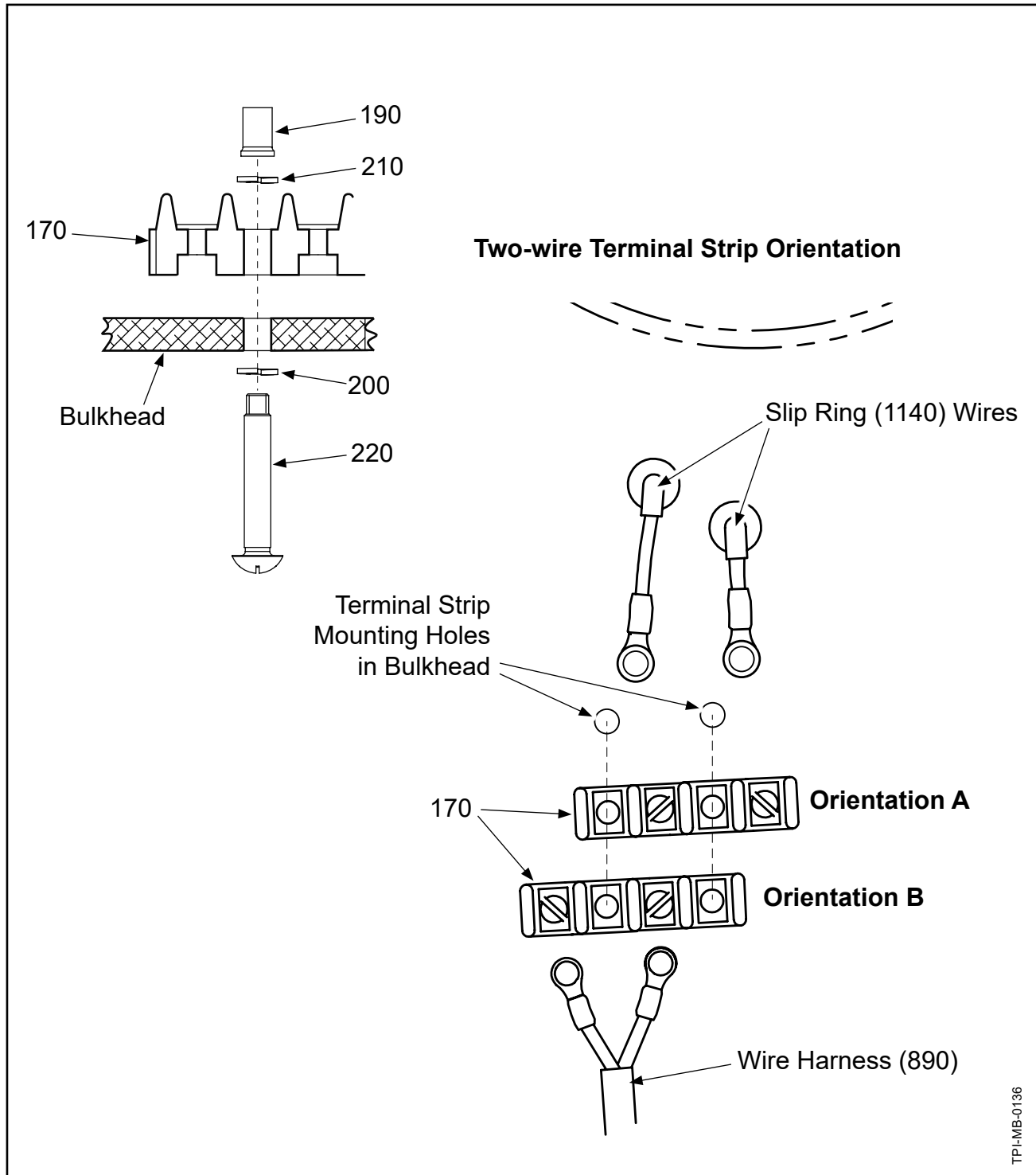


**Slip Ring Mounting  
Figure DV-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106298, 106299, and 109545**

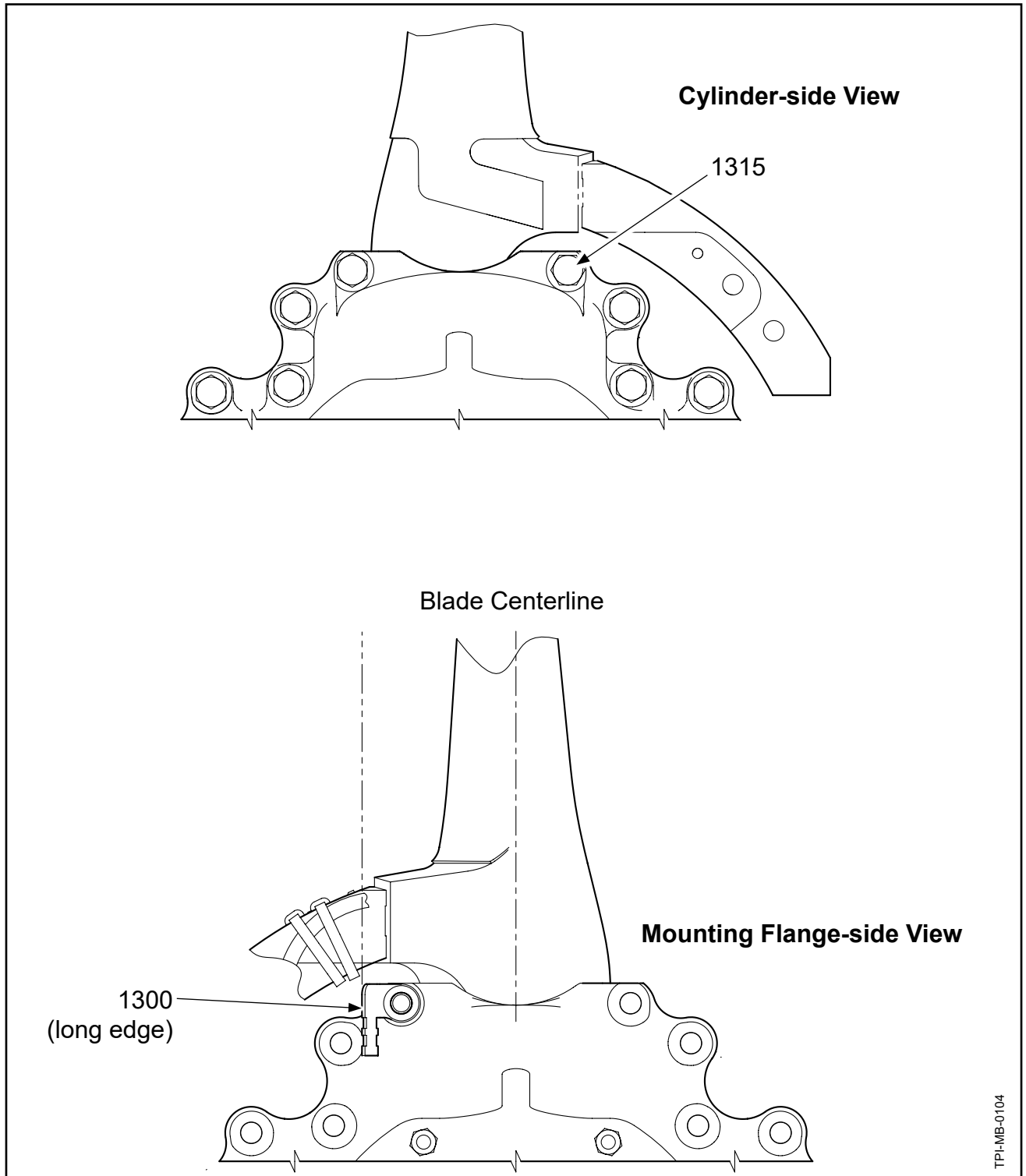


**Terminal Strip Hardware Configuration: Bulkhead Mounted  
Figure DV-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106298, 106299, and 109545**

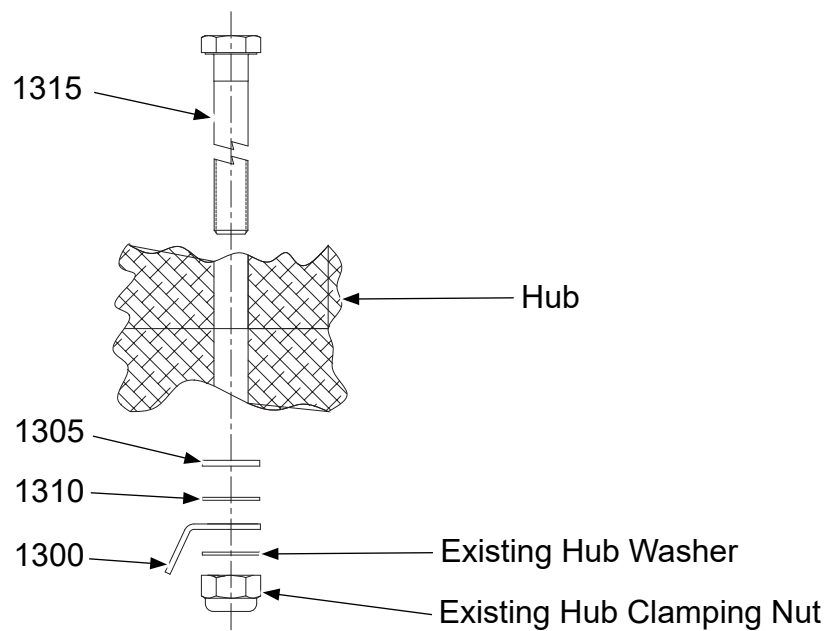


**Hub Clamping Bolt Replacement and De-ice Bracket Alignment  
Figure DV-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106298, 106299, and 109545**



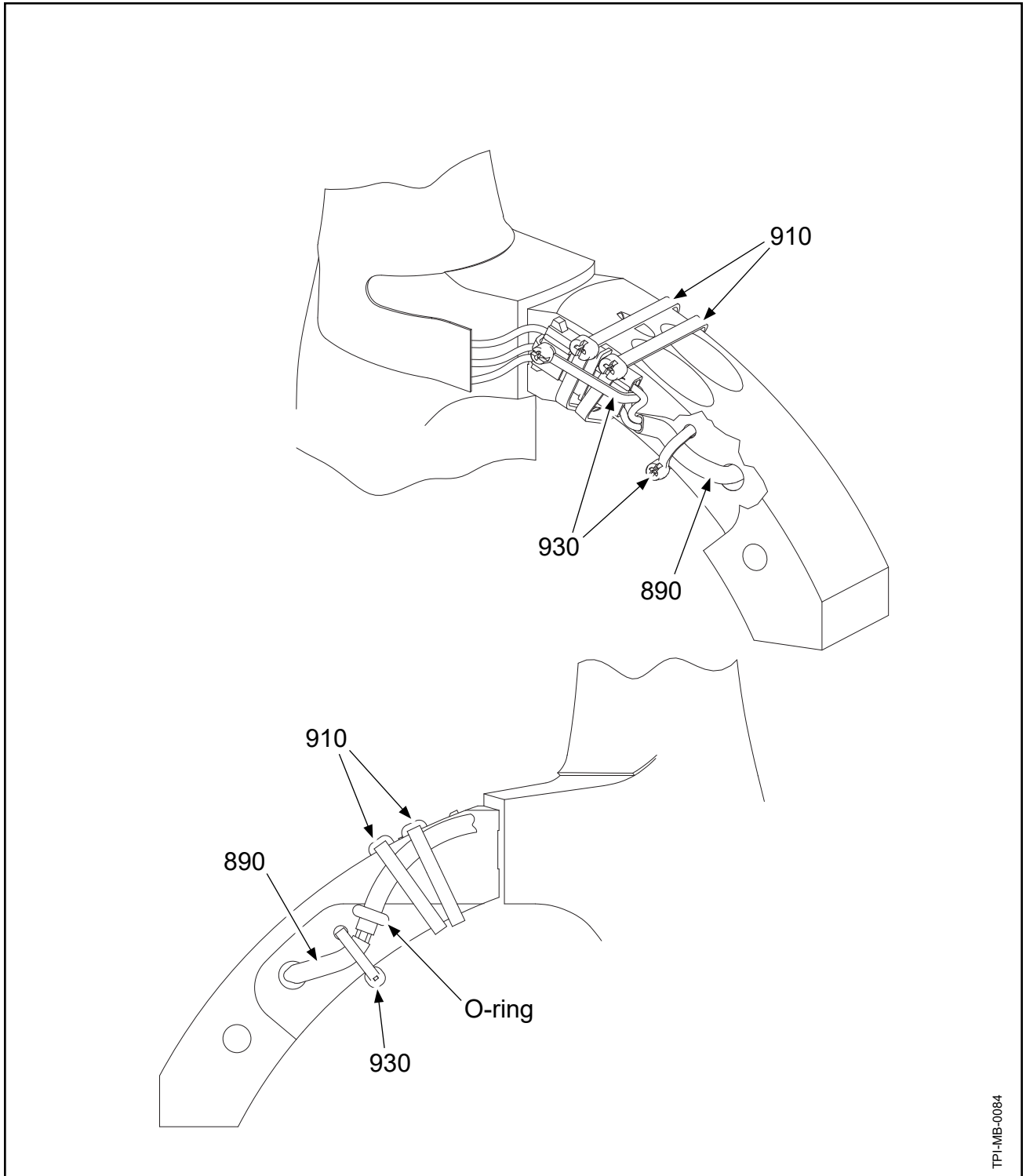
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**Wire Harness Bracket Hardware Configuration  
Figure DV-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106298, 106299, and 109545**

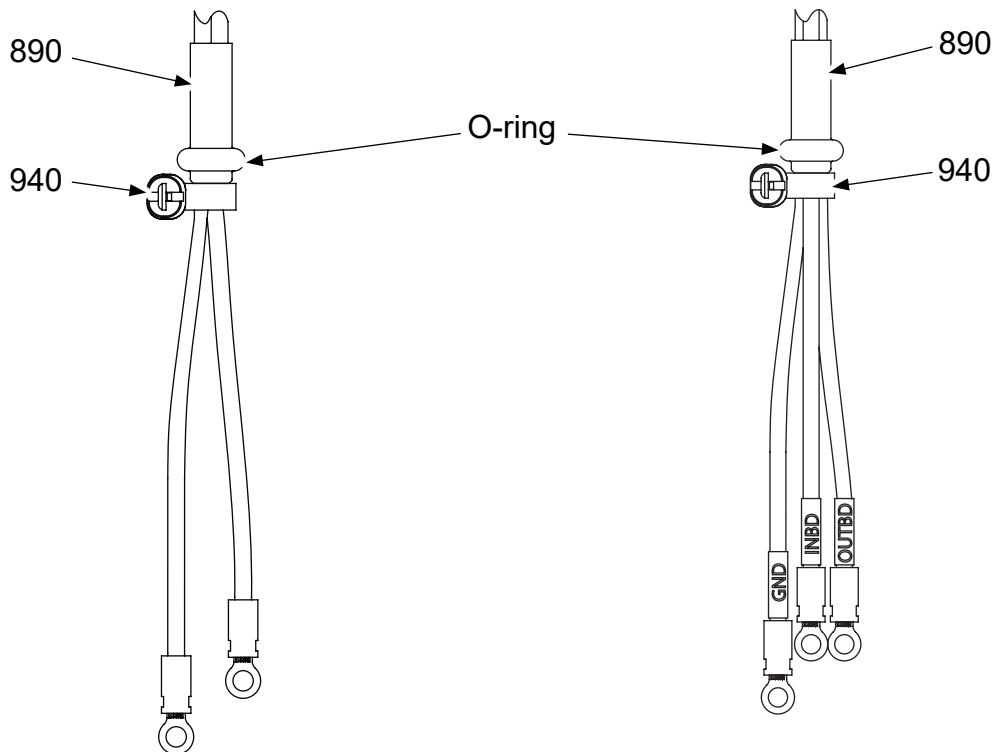


**Wire Harness to Counterweight  
Figure DV-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106298, 106299, and 109545**



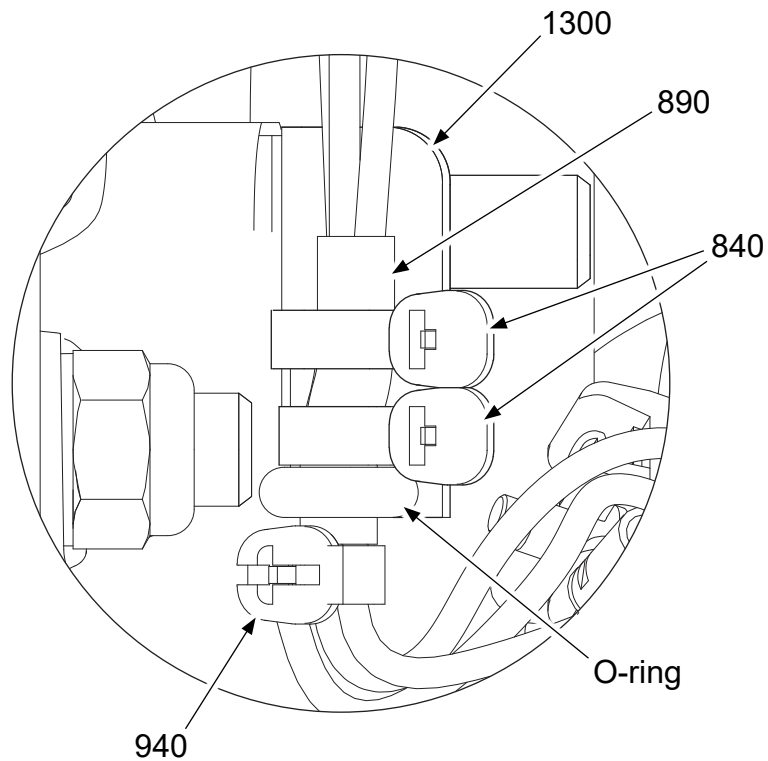
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**Wire Harness Tie Strap Location  
Figure DV-6**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106298, 106299, and 109545**



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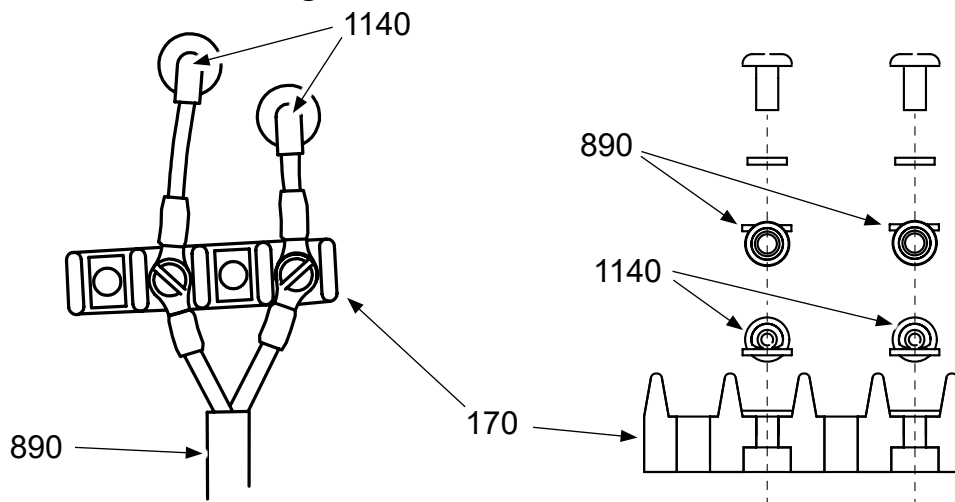
**Wire Harness to De-ice Bracket  
Figure DV-7**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106298, 106299, and 109545**

**Typical Two-wire Configuration**



**NOTE:** The illustrations show slip ring wires on a  
typical right-hand (rotation) propeller.

**Terminal Strip Lead Wire Configuration: Bulkhead Mounted  
Figure DV-8**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106298, 106299, and 109545**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>106298</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11DV</b> <b>FIGURES: DV-1 thru DV-8</b>		
170	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM	4	
190	2H1365	• TAPPED EYELET	8	Y
200	B-3854-41	• WASHER, LOCK	8	Y
210	B-3854-41	• WASHER, LOCK	8	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	8	Y
840	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
1300	B-6265	• BRACKET, WIRE HARNESS	4	
1315	102691	• BOLT, 3/8-24, HEX HEAD	4	
1305	B-3834-0663	• WASHER	4	Y
1310	B-3834-0632	• WASHER	4	Y
890	106278	• WIRE HARNESS	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	8	Y
940	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	4	Y
1140	4H2674-2	• SLIP RING ASSEMBLY	1	
1205	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	8	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 106298**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106298, 106299, and 109545**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>106299</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11DV</b> <b>FIGURES: DV-1 thru DV-8</b>		
170	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM	4	
190	2H1365	• TAPPED EYELET	8	Y
200	B-3854-41	• WASHER, LOCK	8	Y
210	B-3854-41	• WASHER, LOCK	8	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	8	Y
840	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
1300	B-6265	• BRACKET, WIRE HARNESS	4	
1315	102691	• BOLT, 3/8-24, HEX HEAD	4	
1305	B-3834-0663	• WASHER	4	Y
1310	B-3834-0632	• WASHER	4	Y
890	106278	• WIRE HARNESS	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	8	Y
940	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	4	Y
1140	4H2674-1	• SLIP RING ASSEMBLY	1	
1205	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	8	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 106299**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106298, 106299, and 109545**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>109545</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11DV</b> <b>FIGURES: DV-1 thru DV-8</b>		
170	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM	4	
190	2H1365	• TAPPED EYELET	8	Y
200	B-3854-41	• WASHER, LOCK	8	Y
210	B-3854-41	• WASHER, LOCK	8	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	8	Y
840	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
1300	B-6265	• BRACKET, WIRE HARNESS	4	
1315	102691	• BOLT, 3/8-24, HEX HEAD	4	
1305	B-3834-0663	• WASHER	4	Y
1310	B-3834-0632	• WASHER	4	Y
890	106278	• WIRE HARNESS	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	8	Y
940	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	4	Y
1140	108051	• SLIP RING ASSEMBLY	1	
1205	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	8	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 109545**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106298, 106299, and 109545**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106416**

DW. Installation Instruction 11DW

- (1) Install the three washers (1305), existing hub clamping nut, existing hub clamping washer, and bracket (1300) to the hub clamping bolt (1315) in accordance with Figure DW-1.
  - (a) Align the centerline of the bracket (1300) with the slip ring wire marked "POS" as shown in Figure DW-2.
  - (b) Torque the hub clamping nut to 22-25 Ft-Lbs (29-33 N•m).
- (2) Using the screws (1170), attach the slip ring (1140) and the bulkhead to the hub as shown in Figure DW-3.
  - (a) Torque each screw (1170) 8-10 Ft-Lbs (1.01-1.35 N•m).
  - (b) Perform slip ring run-out check in accordance with the Check chapter in this manual.
- (3) Position the terminal strip (170) on the bulkhead in accordance with Orientation B shown in Figure DW-4.
- (4) Using screws (220), washers (200 and 210), and tapped eyelets (190) attach the terminal strip (170) to the bulkhead in accordance with Figure DW-4.
  - (a) Torque the screws to 10-12 Ft-Lbs (1.12-1.35 N•m).
- (5) Position the propeller blades at reverse blade angle.
- (6) Using screws (320) and washers (330), attach the terminal strip (310) to the counterweight in accordance with Figure DW-5 and Figure DW-6.
  - (a) Torque the screws to 10-12 Ft-Lbs (1.12-1.35 N•m).
- (7) Using the screws (805) and washers (815), attach two tie mounts (810) to the counterweight as shown in Figure DW-6.
- (8) Route the terminal ends of the de-ice wire harness lead wires (890) through the hole in the counterweight, as shown in Figure DW-6.
- (9) Attach the de-ice boot lead wires and de-ice wire harness lead wires (890) to the terminal strip (310) in accordance with Figure DW-6 and Figure DW-7.
  - (a) Tighten the terminal strip screws until snug.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106416**

DW. Installation Instruction 11DW - continued

- (10) Using the tie strap (910), secure the de-ice boot lead wires to the counterweight as shown in Figure DW-6.
  - (a) Position the clear tubing on the de-ice boot lead wires on the tie mount (810), then route the tie strap (910) over the clear tubing and through the tie mount (810) as shown in Figure DW-6.
  - (b) Position the head of the tie strap (910) as shown in Figure DW-6, then tighten tie strap.
- (11) Press the spring pin (670) perpendicularly into the hole as shown in Figure DW-6.
  - (a) The spring pin (670) must extend to a height of 0.23 - 0.27 inch (5.8 - 6.8 mm).
- (12) Using the clamp (660), secure the wire harness (890) to the counterweight.
  - (a) Install the clamp (660), around the wire harness (890) as shown in Figure DW-6.
  - (b) Assemble the clamp (660) and washers (655 and 665) on the screw (650) in accordance with Figure DW-8.
  - (c) Apply threadlocker CM399 to the threads of the screw (650).
  - (d) Attach the clamp (660) and wire harness (890) to the counterweight using the screw (650) in accordance with Figure DW-6 and Figure DW-8.
    - 1 Before tightening the screw (650) make sure that the wire harness leads between the terminal strip (310) and the clamp (660) are not twisted.
  - (e) Put the clamp against the spring pin (670).
  - (f) Torque the screw (650) to 22-25 In-Lbs (2.48-2.82 N•m).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106416**

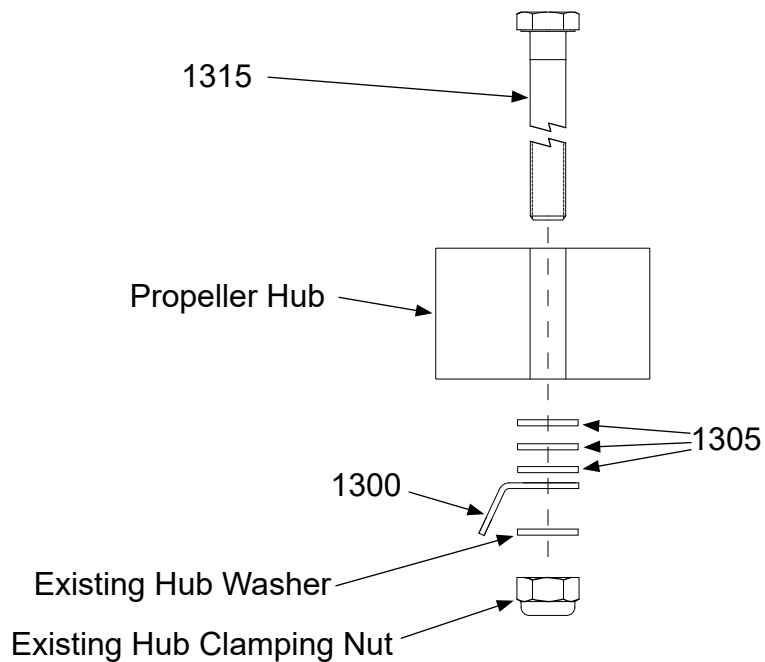
DW. Installation Instruction 11DW - continued

- (13) Using tie strap (910), secure the de-ice wire harness (890) to the counterweight outboard of the clamp (660) as shown in Figure DW-6.
  - (a) On the terminal strip-side of the counterweight, route the tie strap (910) under the de-ice wire harness lead wires (890) as shown in Figure DW-6.
  - (b) On the clamp-side of the counterweight, route the tie strap (910) over the de-ice wire harness lead wires (890) and through the tie mount (810) as shown in Figure DW-6.
  - (c) Do not tighten the tie strap (910) at this time.
  - (d) Make sure the clear tubing on the wire harness (890) is under the tie strap (910) as shown in Figure DW-6.
  - (e) Position the head of the tie strap (910) as shown in Figure DW-6, then tighten the tie strap.
- (14) Position the wire harness (890) on the bracket (1300) with the O-ring as shown in Figure DW-2.
- (15) Install the tie straps (840) as shown in Figure DW-2. Twisting of the lead wire is not permitted.
- (16) Install the slip ring lead wires and de-ice wire harness (890) to the bulkhead terminal strip (170) in accordance with Figure DW-9.
  - (a) Tighten the terminal strip screws until snug.
- (17) Cycle the propeller from low angle to high angle to verify correct wire harness installation. Make sure the wire harness is not blocked during cycling.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106416**



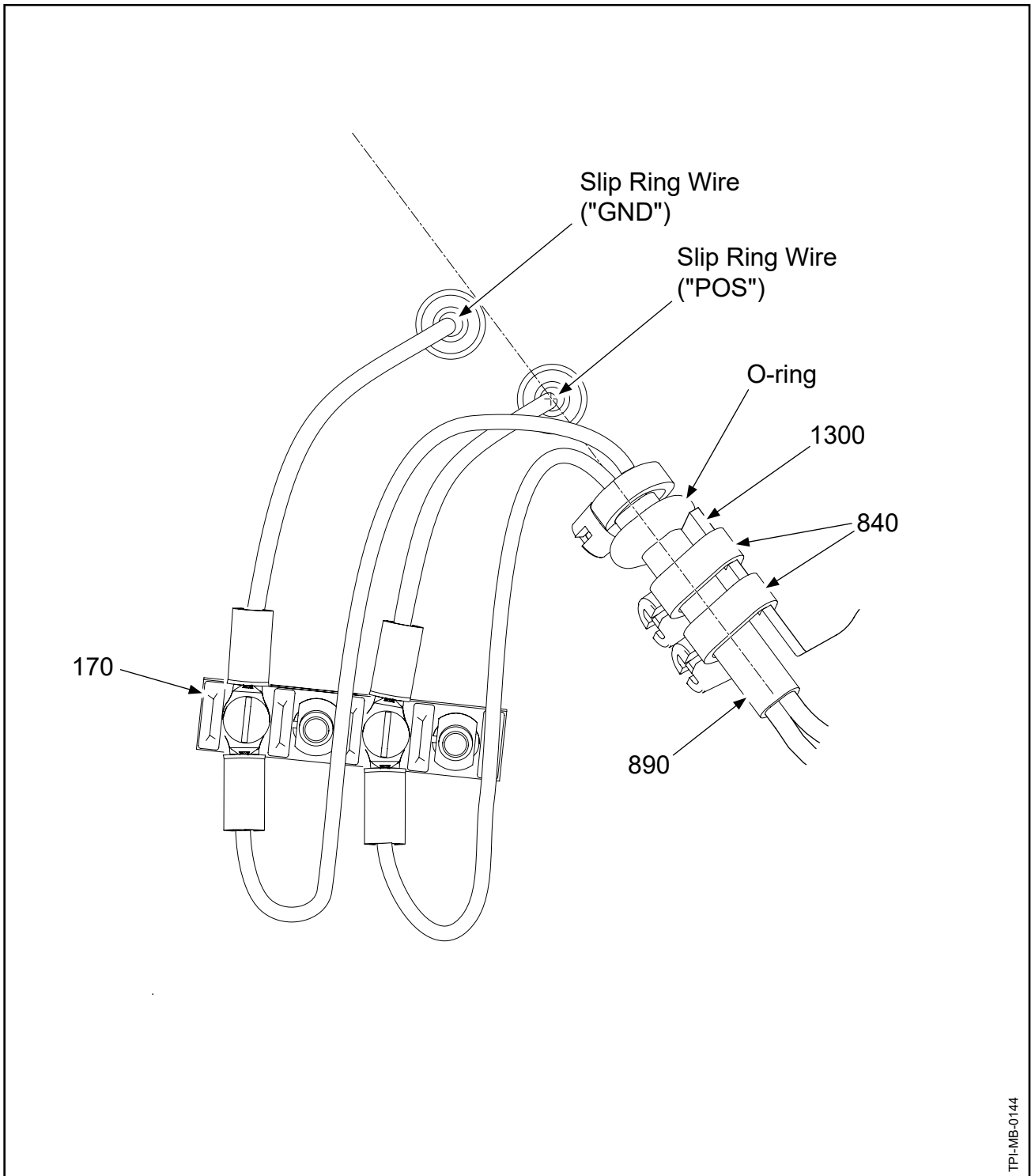
TI-1800811

**Wire Harness Bracket Hardware Configuration  
Figure DW-1**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106416**

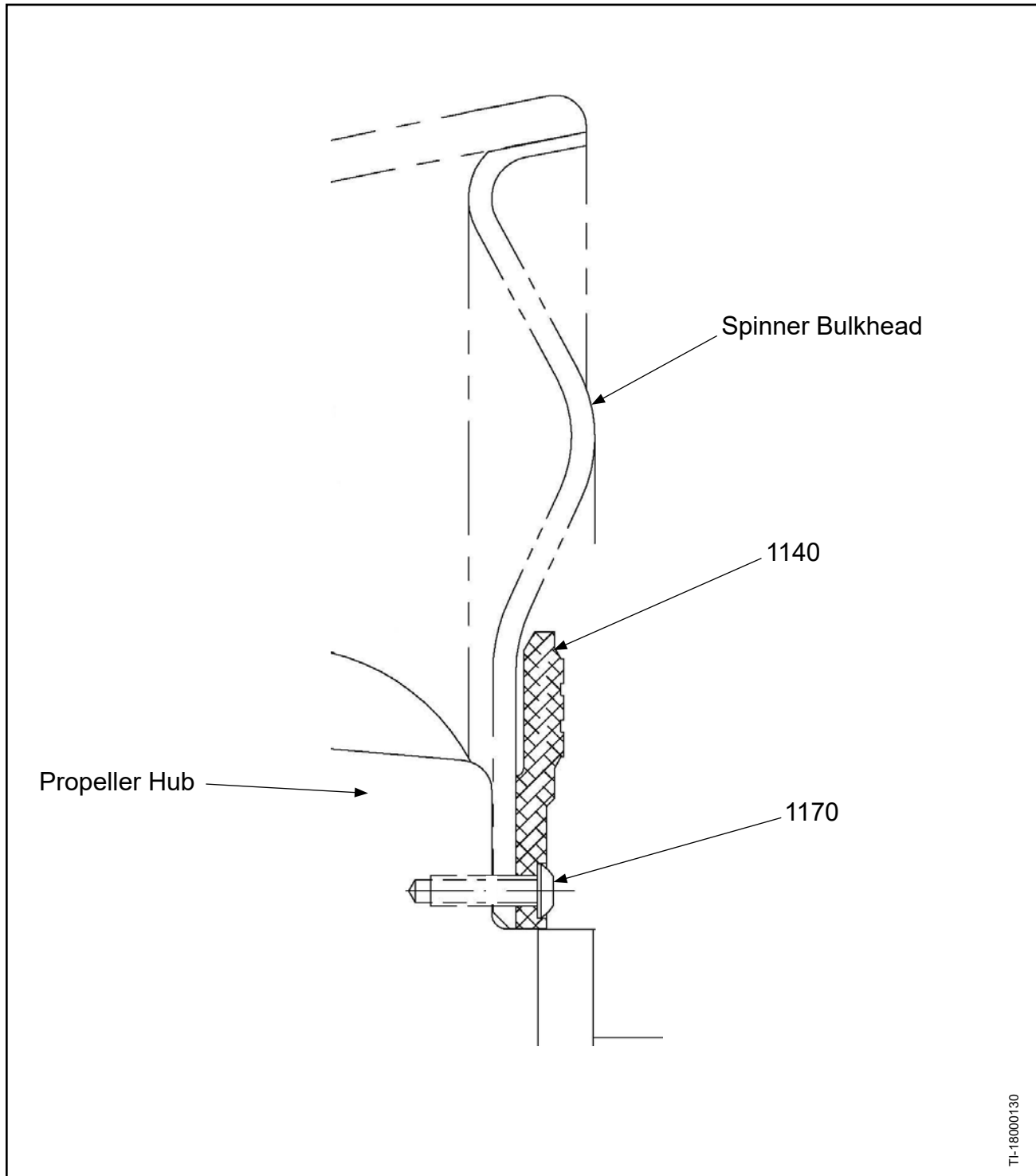


**Wire Harness to De-ice Bracket  
Figure DW-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106416**

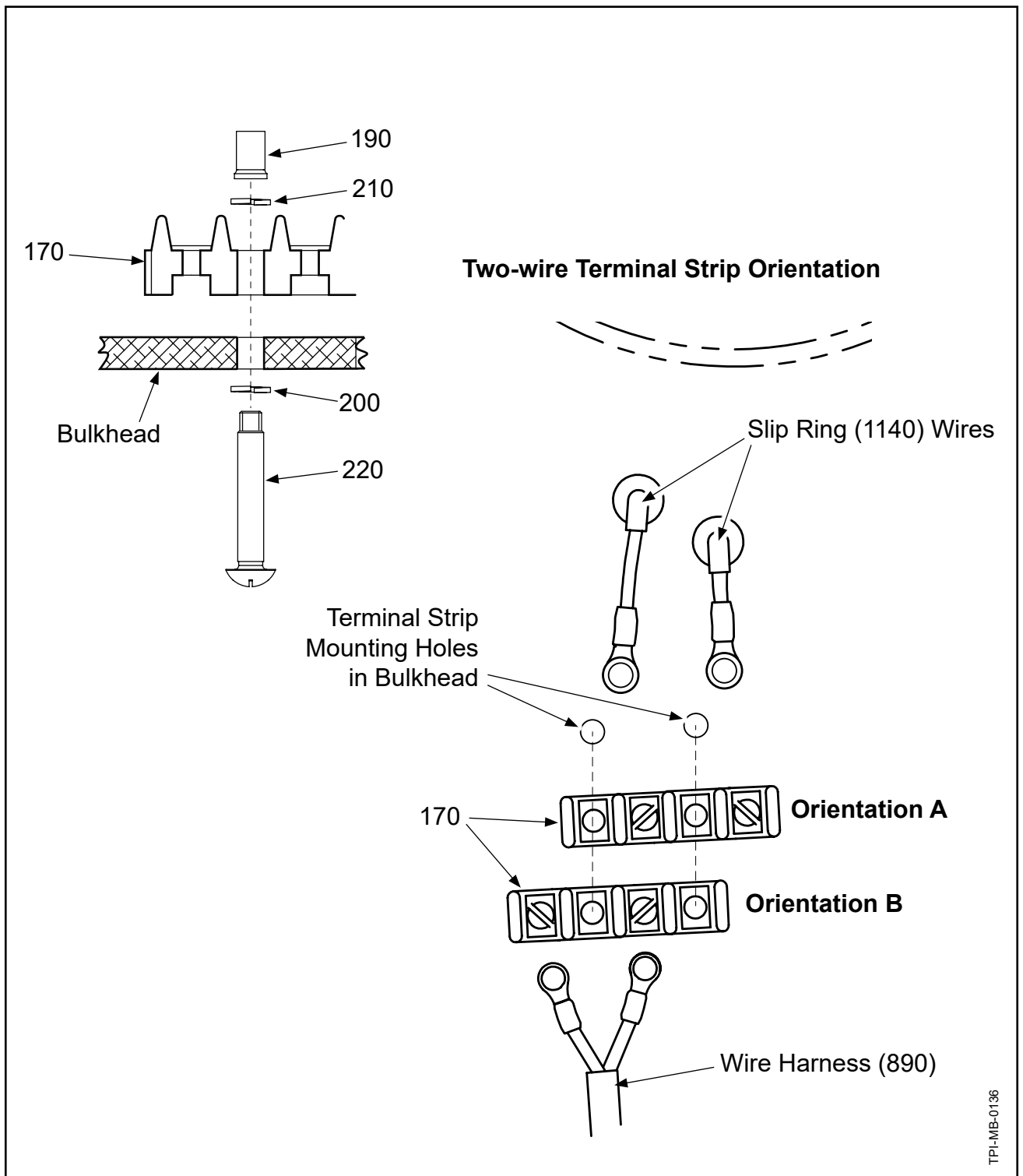


**Slip Ring Mounting  
Figure DW-3**

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

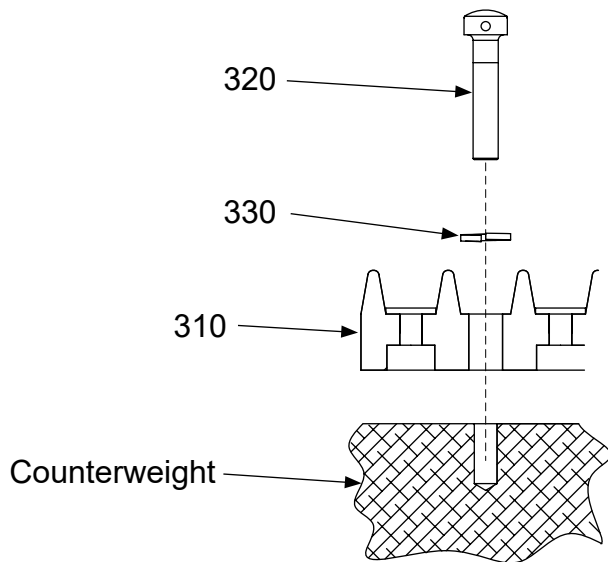
**106416**



**Terminal Strip Hardware Configuration: Bulkhead Mounted**  
**Figure DW-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106416**

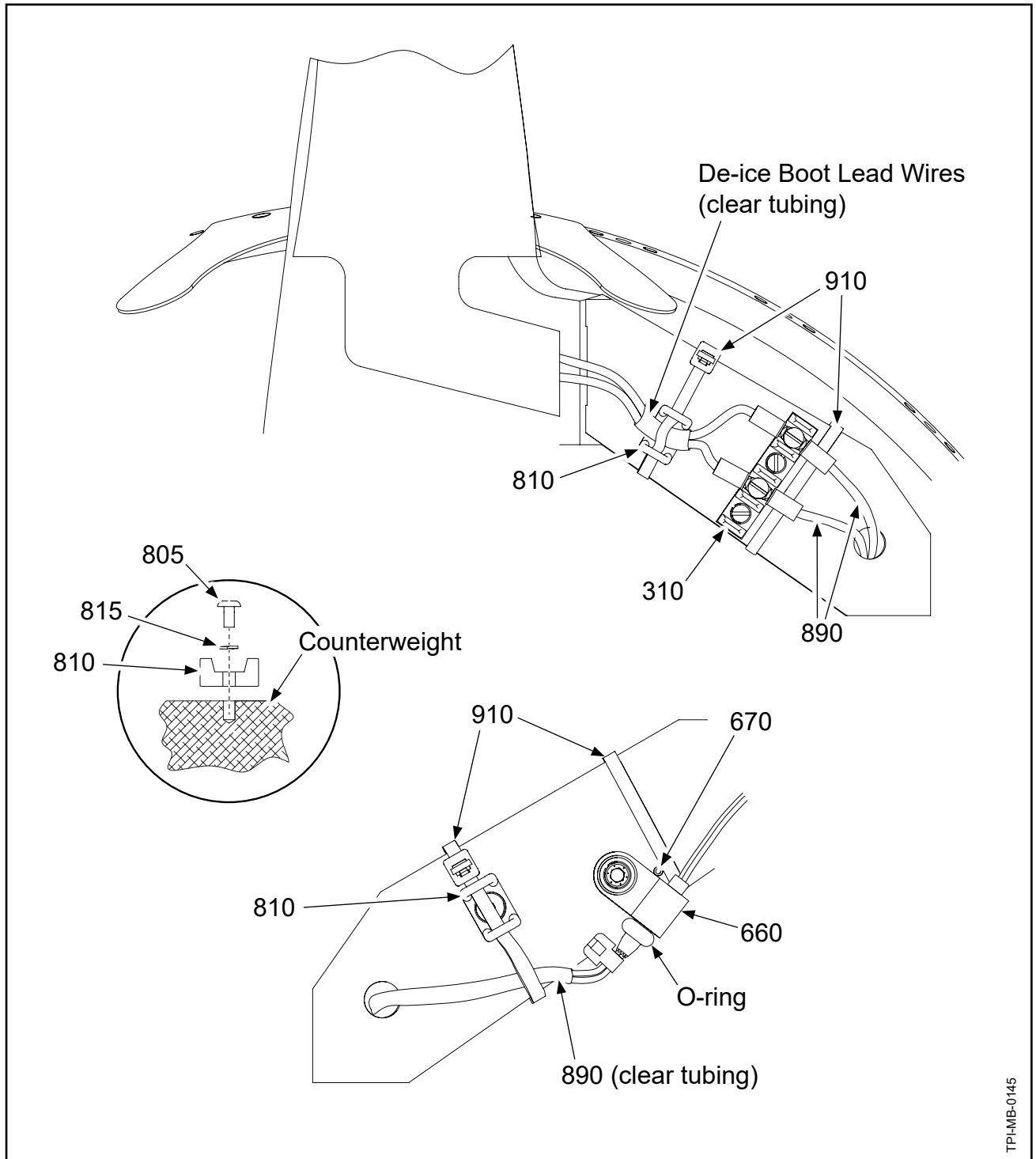


TPI-MB-0137

**Terminal Strip Hardware Configurations: Counterweight Mounted  
Figure DW-5**

# **HARTZELL ICE PROTECTION SYSTEM MANUAL 180**

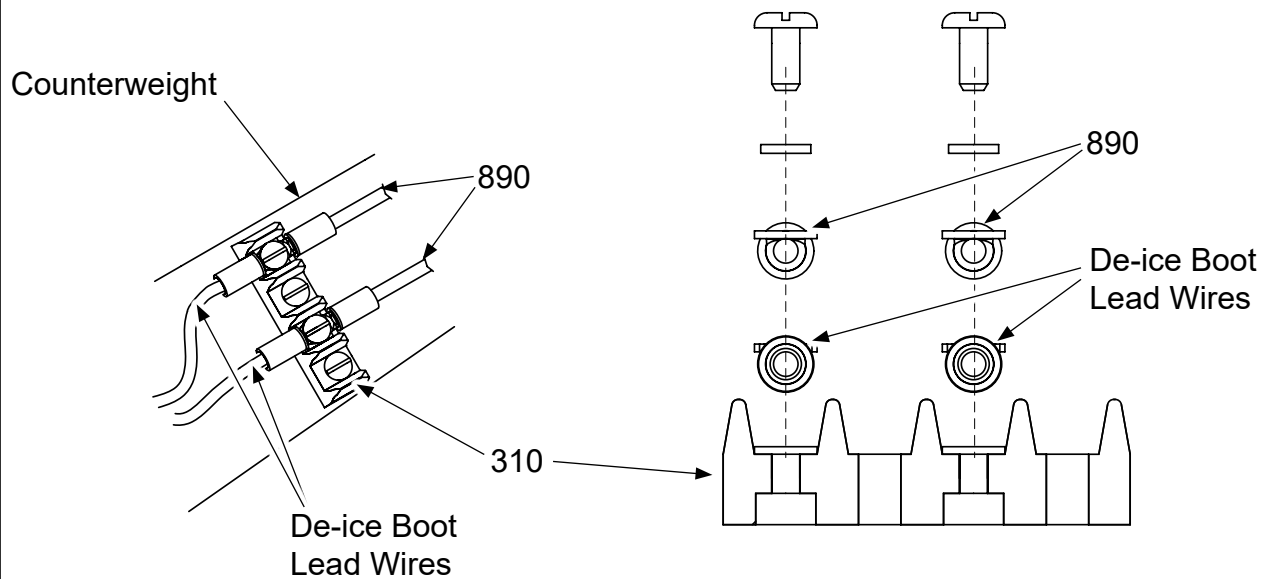
This section includes the parts list(s) and installation instructions for the following electric de-ice kit(s):  
**106416**



**Wire Harness to Counterweight  
Figure DW-6**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106416**



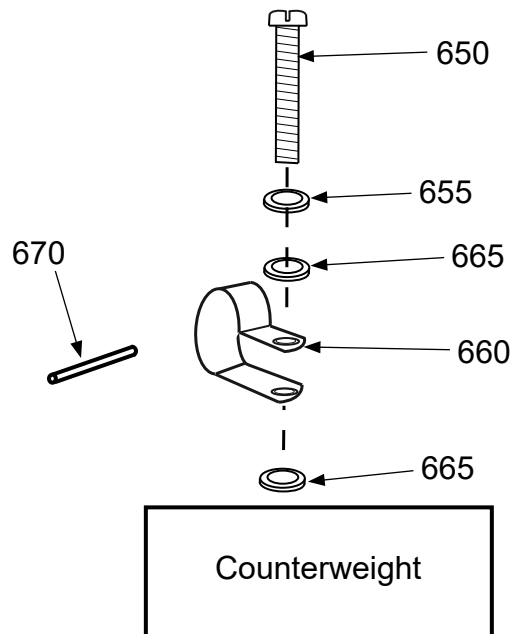
**Typical Two-wire Configuration**

TPL-MB-0138

**Terminal Strip Lead Wire Configurations: Counterweight Mounted  
Figure DW-7**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106416**



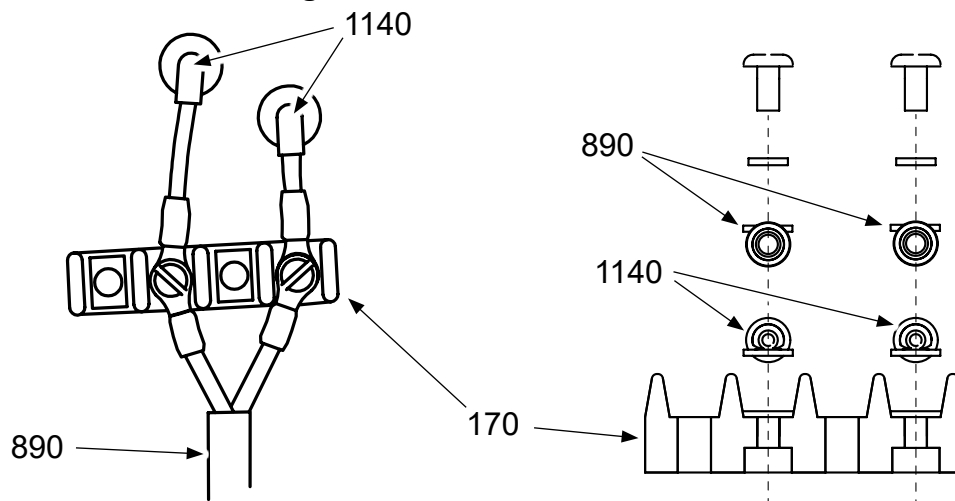
**Loop Clamp to Counterweight Hardware Configurations  
Figure DW-8**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106416**

**Typical Two-wire Configuration**



**NOTE:** The illustrations show slip ring wires on a  
typical right-hand (rotation) propeller.

**Two-wire Configurations**

TPI-MB-0129

**Terminal Strip Lead Wire Configurations: Bulkhead Mounted  
Figure DW-9**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106416**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>106416</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11DW</b> <b>FIGURES: DW-1 thru DW-9</b>		
170	1H1150-3	• TERMINAL STRIP	4	
190	2H1365	• TAPPED EYELET	8	Y
200	B-3854-41	• WASHER, LOCK	8	Y
210	B-3854-41	• WASHER, LOCK	8	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	8	Y
645	B-3855-31	• DELETED	-	
650	B-7381-H10	• SCREW, 8-32, CAP	4	Y
655	B-3854-42	• WASHER, LOCK	4	Y
665	B-3837-N832	• WASHER, CORROSION RESISTANT	8	Y
660	B-3853-F5	• CLAMP, LOOP, CUSHIONED	4	Y
670	B-3842-0500	• SPRING PIN, 3/32", CRES	4	Y
310	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM	4	
320	B-6631-231	• SCREW, 6/32, FILLISTER HEAD, CRES	8	Y
330	B-3854-41	• WASHER, LOCK	8	Y
805	102440	• SCREW, 8/32, BUTTON HEAD	8	Y
810	7931-TM2S8(BLK)	• TM2S8-C-0, BLACK TIE MOUNT	8	
815	B-3854-42	• WASHER, LOCK	8	Y
890	106409	• WIRE HARNESS	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
840	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	8	Y
1300	105558	• BRACKET, WIRE HARNESS	4	
1305	B-3834-0663	• WASHER	12	Y
1315	102691	• BOLT, 3/8-24, HEX HEAD	4	
1140	106419	• SLIP RING ASSEMBLY	1	
1170	A-2070-11	• SCREW, 1/4-28, BUTTON HEAD	8	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 106416**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106416**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106576**

**DX. Installation Instruction 11DX**

- (1) Using the bolts (1205) and washers (1210), attach the slip ring (1140), the aircraft manufacturer's pulley set, and the bulkhead to the hub as shown in Figure DX-1.
  - (a) Using anti-seize CM118, torque each bolt (1205) to 36-44 In-Lbs (4.1-4.9 N•m).
  - (b) Perform a slip ring run-out check in accordance with the Check chapter in this manual.
- (2) Position the terminal strip (170) on the bulkhead in accordance with Orientation A in Figure DX-2.
- (3) Using screw (220), washers (200 and 210), and tapped eyelet (190), attach the terminal strip (170) to the bulkhead in accordance with Figure DX-2.
  - (a) Torque the screws (220) to 10-12 In-Lb (1.13-1.35 N•m).
- (4) Install the wire harness bracket (1300).
  - (a) Install one washer (1305), one washer (1310), one wire harness bracket (1300), the existing hub washer, and the existing hub clamping nut onto the hex head bolt (1315) in accordance with Figure DX-3.
  - (b) Position the wire harness bracket (1300) so that the long edge of the bracket is parallel with the blade centerline as shown in Figure DX-4.
  - (c) Torque the hub clamping nut (dry) to 20-24 Ft-Lbs (27 - 33 N•m).
- (5) Position the propeller blades at low blade angle.
- (6) Assemble the plug connection between the wire harness (890) and the de-ice boot.
  - (a) Install one tie strap (930) around the wire harness/de-ice boot plug connection as shown in Figure DX-5. Do not tighten the tie strap.
    - 1 Position the head of tie strap (930) in the approximate location shown in Figure DX-5.
- (7) Route the terminal ends of the wire harness (890) through the hole in the counterweight as shown in Figure DX-5.
  - (a) Position the wire harness (890) so that equal lengths of the clear tubing are on each side of the counterweight.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106576**

**DX. Installation Instruction 11DX - continued**

- (8) Install the clamp (660) around the wire harness (890) with the O-ring positioned against the clamp as shown in Figure DX-5.
  - (a) Apply threadlocking adhesive CM399 to the threads of the screw (650).
  - (b) Using the screw (650), washer (665), and lockwasher (655) attach the clamp (660) to the counterweight in accordance with Figure DX-6.
    - 1 Torque the screw (650) to 22-25 In-Lbs.(2.5-2.8 N•m).
- (9) Secure the wire harness/de-ice boot plug connection to the counterweight.
  - (a) Install two tie straps (910) under the tie strap (930) that secures the plug connection, and around the counterweight/wire harness as shown in Figure DX-5. Do not tighten the tie straps.
    - 1 Position the heads of the two tie straps (910) as shown in Figure DX-5.
  - (b) Install one tie strap (910) under the counterweight and around the clear tubing on the wire harness (890) as shown in Figure DX-5. Do not tighten the tie strap.
    - 1 Make sure the tie strap (910) is over the clear tubing of the wire harness (890) on both sides of the counterweight.
    - 2 Install one tie strap (950) around the clear tubing on the wire harness (890) and the tie strap (910) on both sides of the counterweight as shown in Figure DX-5.
- (10) Make sure the wire harness/tie straps are positioned correctly, then tighten all of the tie straps in the following order:
  - (a) The tie strap (930) securing the wire harness/de-ice boot plug connection
  - (b) The three tie straps (910) around the wire harness/counterweight
  - (c) The two tie straps (950) around the tie strap (910)
- (11) Install one tie strap (940) around the wire harness (890) below the O-ring at the terminal-end of the harness (890) as shown in Figure DX-7.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106576**

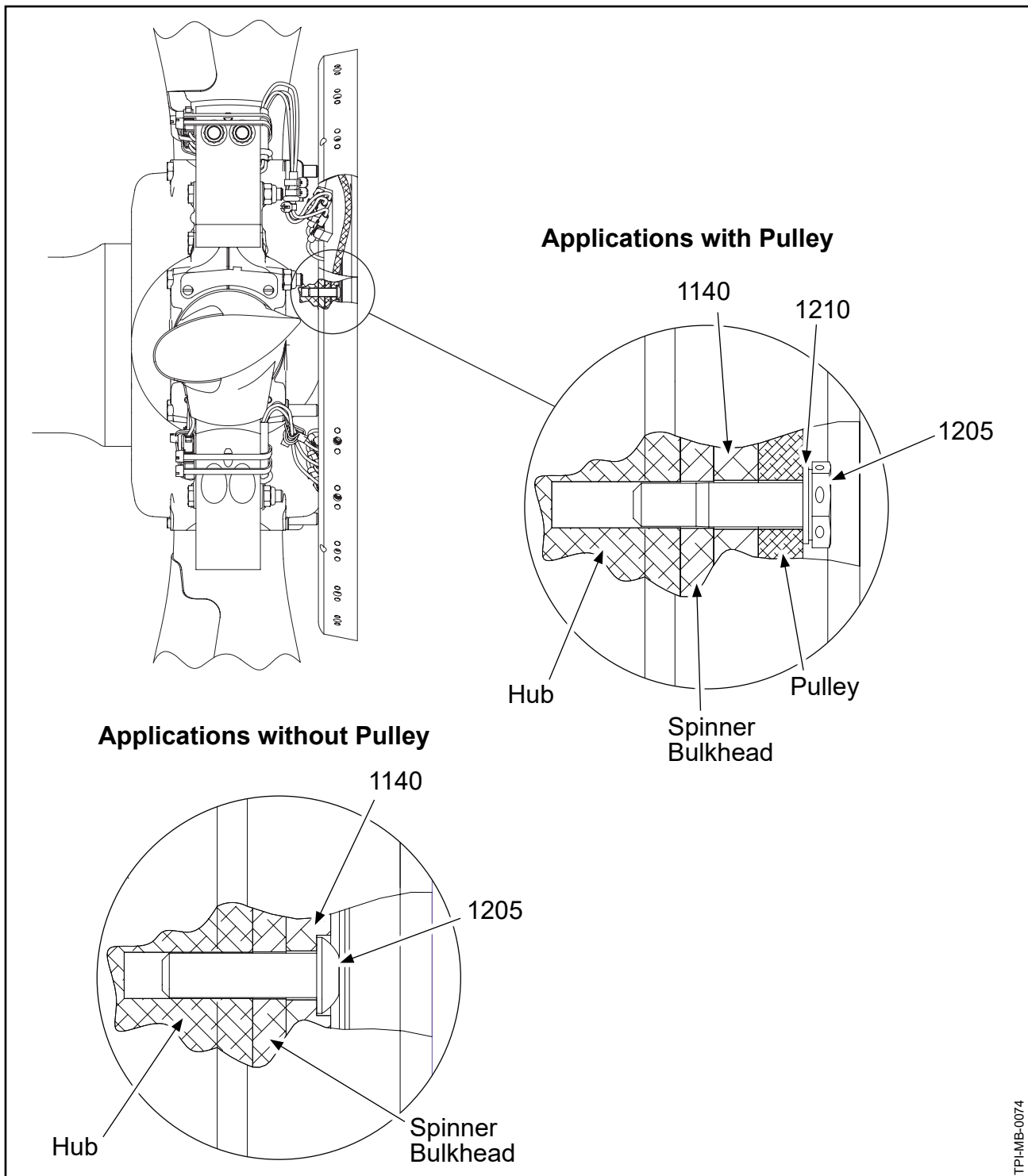
**DX.**    Installation Instruction 11DX - continued

- (12) Secure the wire harness (890) to the wire harness bracket (1300).
  - (a) Position the O-ring/shrink tubing on the terminal end of the wire harness (890) so that the O-ring is on top of the wire harness bracket (1300) as shown in Figure DX-8.
    - 1    Make sure the lead wires are not twisted or bent sharply.
  - (b) Install and tighten two tie straps (840) around the bracket and the shrink tubing on the wire harness as shown in Figure DX-8.
    - 1    Position the tie straps (840) in the grooves on the wire harness bracket (1300).
    - 2    Position the heads of the tie straps (840) as shown in Figure DX-8.
- (13) Install the lead wires from the slip ring (1140) and the lead wires from the wire harness (890) to the terminal strip (170) in accordance with Figure DX-9.
  - (a) Position the ring terminals as shown in Figure DX-9.
  - (b) Install the terminal screws and washers as shown in Figure DX-9.
  - (c) Tighten the terminal screws until snug.
- (14) Cycle the propeller from low angle to feather angle to verify correct wire harness installation. Make sure the wire harness is not blocked during cycling.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106576**

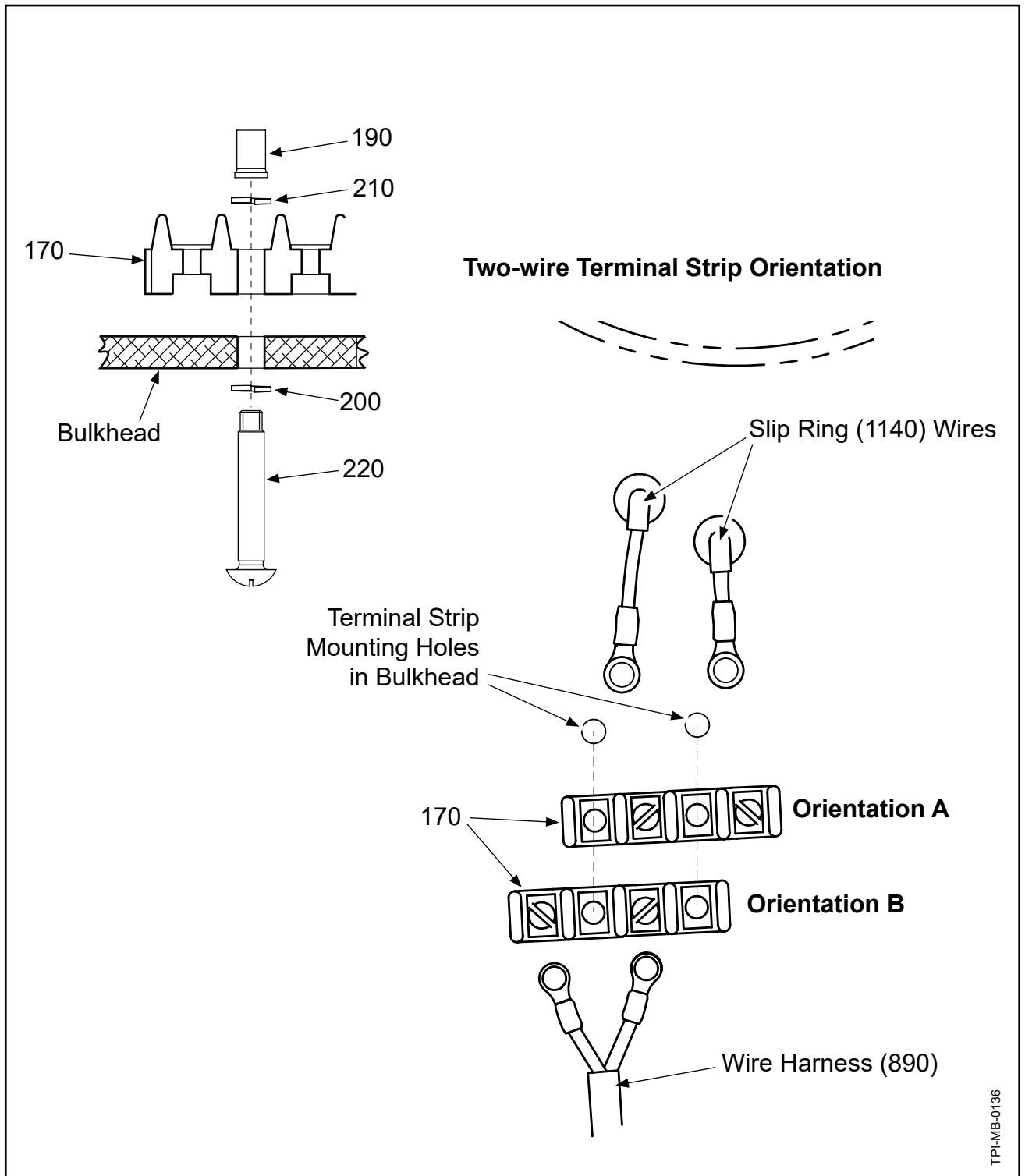


**Slip Ring Mounting  
Figure DX-1**

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

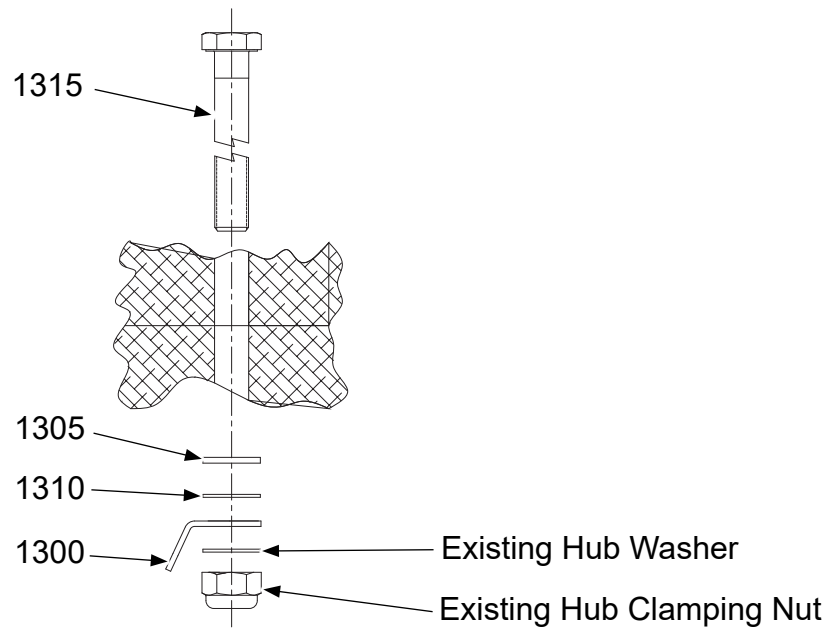
**106576**



**Terminal Strip Hardware Configuration: Bulkhead Mounted  
Figure DX-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106576**



TPH-MB-0087-

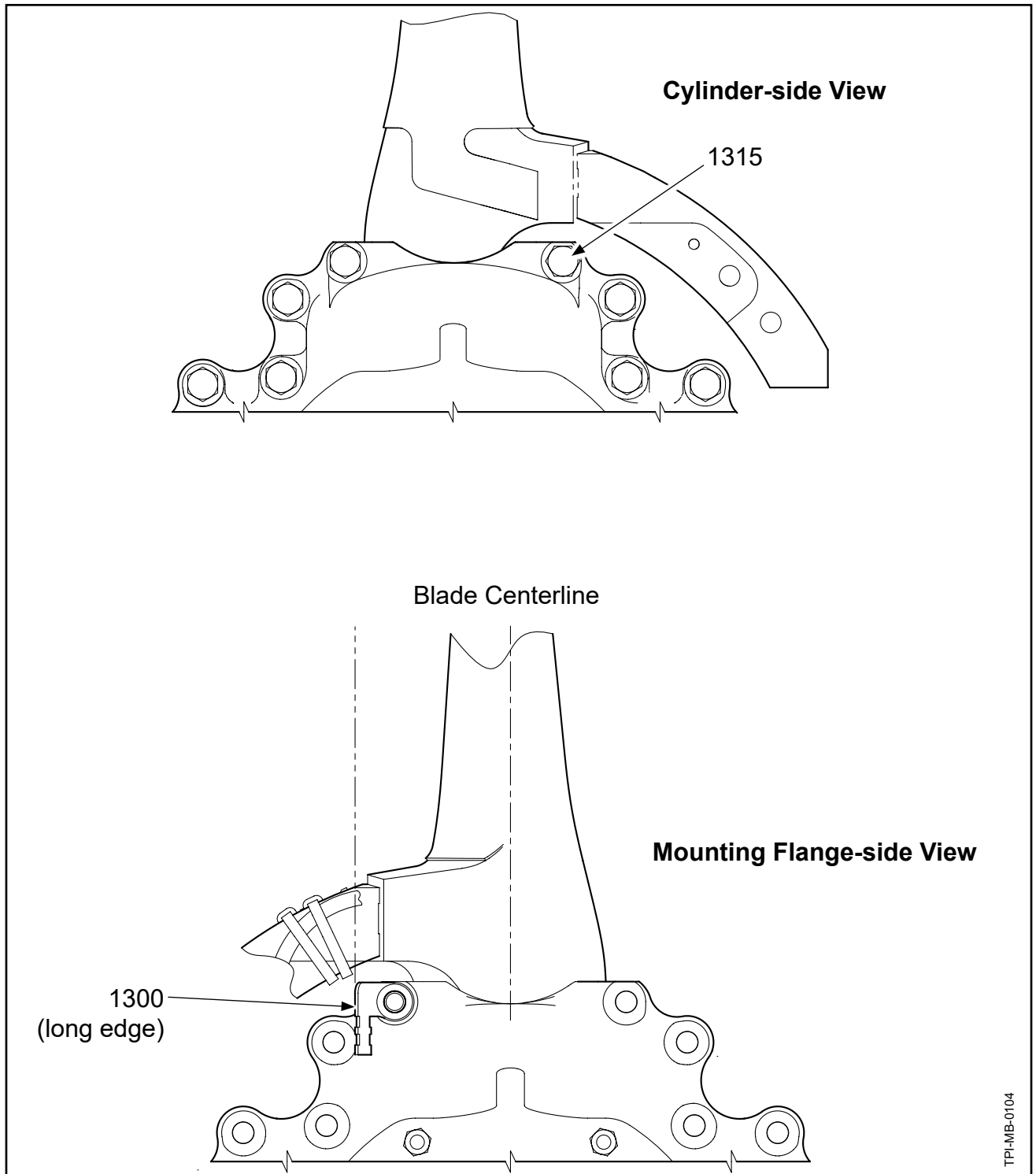
**Wire Harness Bracket Hardware Configuration  
Figure DX-3**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106576**

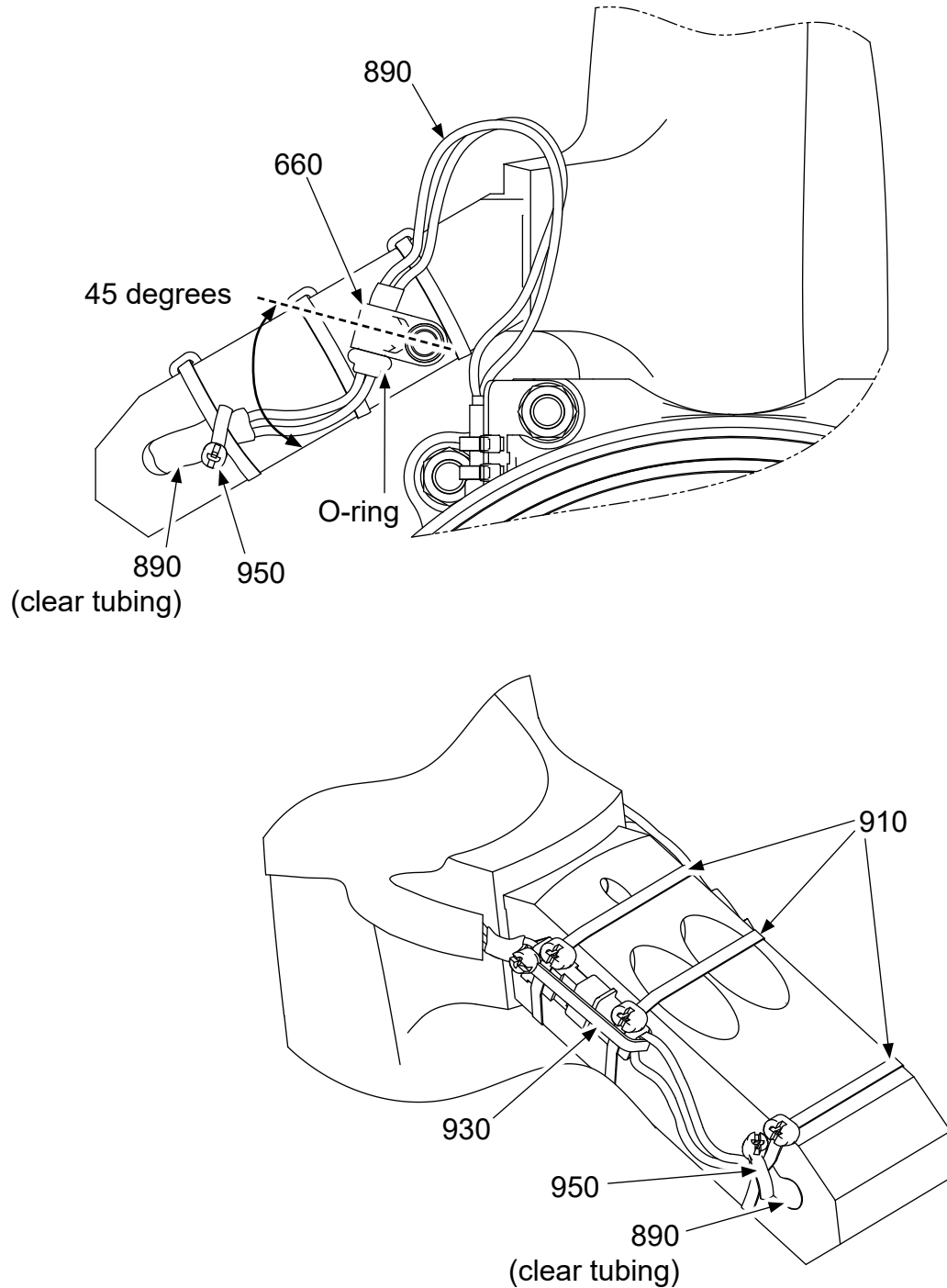


**Hub Clamping Bolt Replacement and De-ice Bracket Alignment  
Figure DX-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106576**



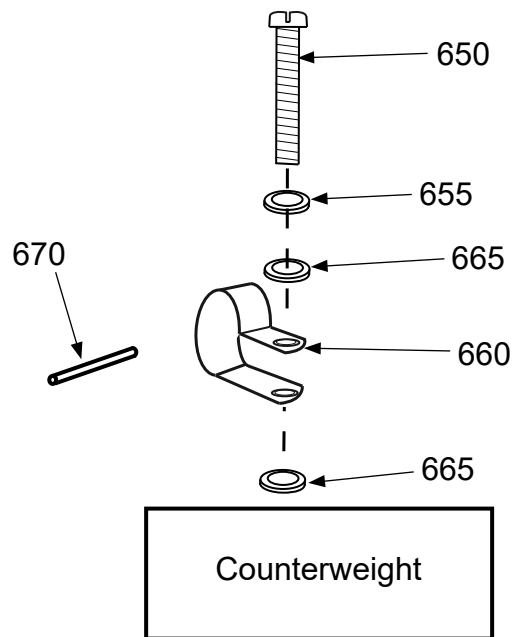
TPI-MB-0173

**Wire Harness-to-Counterweight  
Figure DX-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106576**

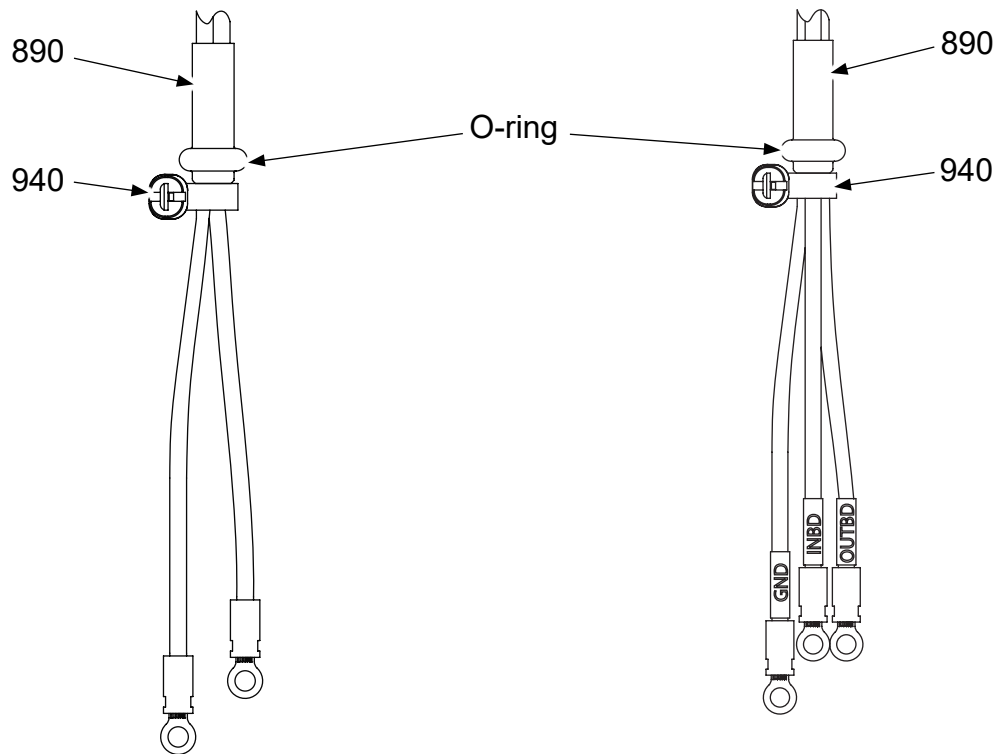


TI-00180ACC  
TI-00180BCC

**Loop Clamp to Counterweight Hardware Configurations  
Figure DX-6**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106576**



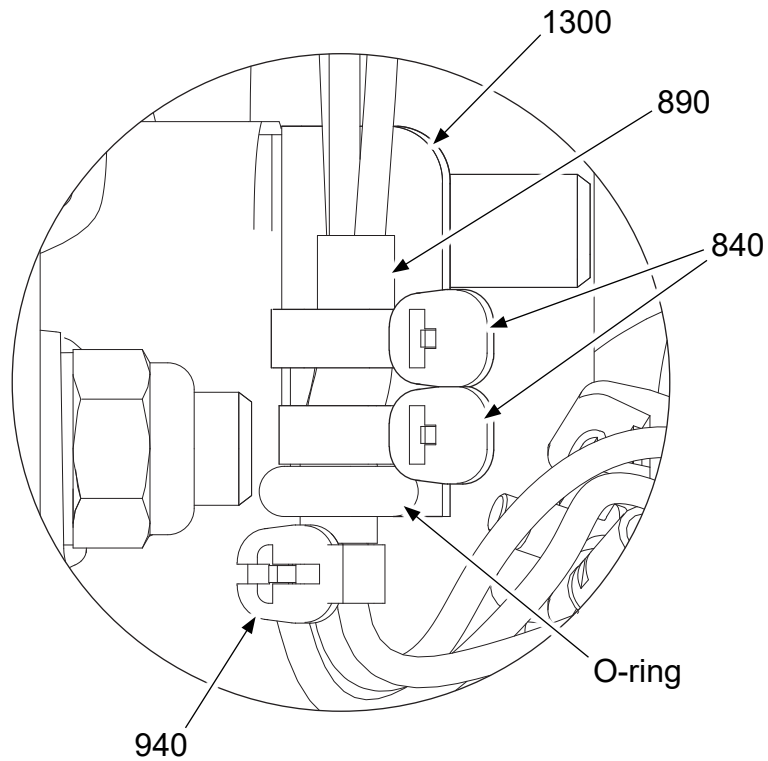
TPI-MB-0130

**Wire Harness Tie Strap Location  
Figure DX-7**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106576**



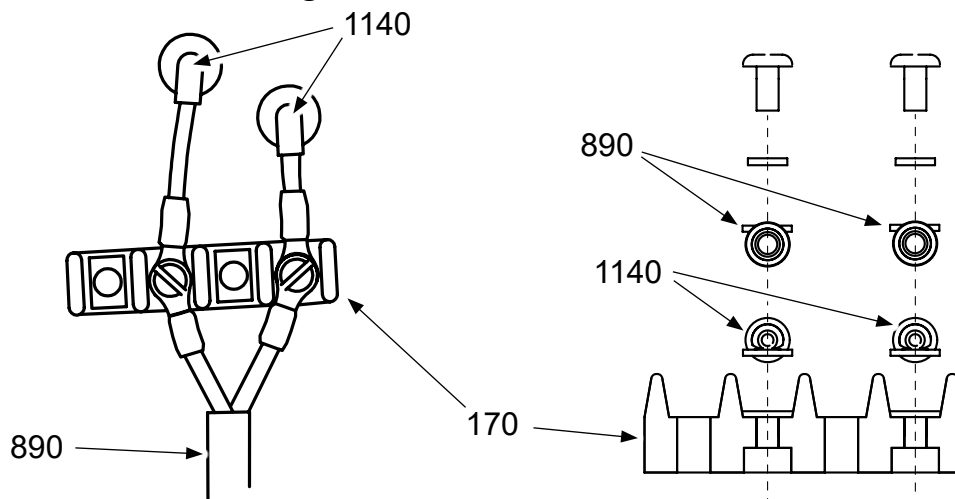
**Wire Harness to De-ice Bracket  
Figure DX-8**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106576**

**Typical Two-wire Configuration**



**NOTE:** The illustrations show slip ring wires on a typical right-hand (rotation) propeller.

**Two-wire Configurations**

TP1-MB-0129

**Terminal Strip Lead Wire Configurations: Bulkhead Mounted  
Figure DX-9**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106576**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>106576</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>SUPERSEDES 7931-67-944-1</b> <b>INSTALLATION INSTRUCTION 11DX</b> <b>FIGURES: DX-1 thru DX-9</b>		
170	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM	4	
190	2H1365	• TAPPED EYELET	8	Y
200	B-3854-41	• WASHER, LOCK	8	Y
210	B-3854-41	• WASHER, LOCK	8	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	8	Y
645	B-3855-31	• DELETED	-	
650	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
655	B-3854-42	• WASHER, LOCK	4	Y
660	B-3853-F5	• CLAMP, LOOP, PLASTIC	4	Y
665	B-3837-N832	• WASHER, CORROSION RESISTANT	8	Y
890	106575	• WIRE HARNESS	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	12	Y
930	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	4	Y
950	B-3852-5-0	• STRAP, TEIDOWN, PLASTIC	8	Y
840	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
940	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	4	Y
1140	4H4015-1	• SLIP RING ASSEMBLY		1
1205	B-3384-8H	• BOLT, 1/4-28, HEX HEAD	8	Y
1210	B-3851-0463	• WASHER	8	Y
1300	B-6265	• BRACKET, WIRE HARNESS	4	
1305	B-3834-0663	• WASHER	4	Y
1310	B-3834-0632	• WASHER	4	Y
1315	102691	• BOLT, 3/8-24, HEX HEAD	4	

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 106576**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106576**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**102441-1 and 102441-2**

**DY.    Installation Instruction 11DY**

- (1) Using the bolts (1200 and 1225), washers (1210), spring washers (1215), and nuts (1220), attach the slip ring (1140), and the bulkhead to the hub in accordance with Figure DY-1.
  - (a) Torque the bolts (1200 and 1225) 40-120 In-Lbs. (4.51- 13.55 N•m).
  - (b) Perform a slip ring run-out check in accordance with the Check chapter in this manual.
- (2) 102441-2 Kit Only: Position the terminal strip (170) on the bulkhead in accordance with Orientation A in Figure DY-2.
- (3) Using screws (220) and washers (200), attach the terminal strip (170) to the bulkhead in accordance with Figure DY-2.
  - (a) Torque the screws (220) to 10-12 In-Lb (1.13-1.35 N•m).
- (4) Using screws (1310), attach the wire harness bracket (1300) to the blade clamp in accordance with Figure DY-3.
  - (a) A minimum thread engagement of 0.125 inch (3.17 mm) is required.
    - 1 If balance weights are installed, use the appropriate length screw (1310) to get the required thread engagement.
  - (b) Torque the screws (1310) to 22-26 In-Lb (2.4-2.9 N•m).
  - (c) Using 0.032 inch (0.81 mm) minimum diameter stainless steel wire, safety wire the screws (1310) in accordance with NASM33540.
- (5) Position the propeller blades at reverse blade angle.
- (6) Assemble the plug connection between the wire harness (890) and the de-ice boot.
- (7) Fold the plug connection back over the tubing of the wire harness (890), then put the wire harness tubing and the plug connection under the wire harness bracket (1300) as shown in Figure DY-3.
  - (a) The wire harness (890) must be against the blade clamp and the plug connection must be against the inside of the wire harness bracket (1300).
  - (b) Route the de-ice boot leads out of the plug connection directly under the plug connection/wire harness tubing in accordance with Figure DY-3.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

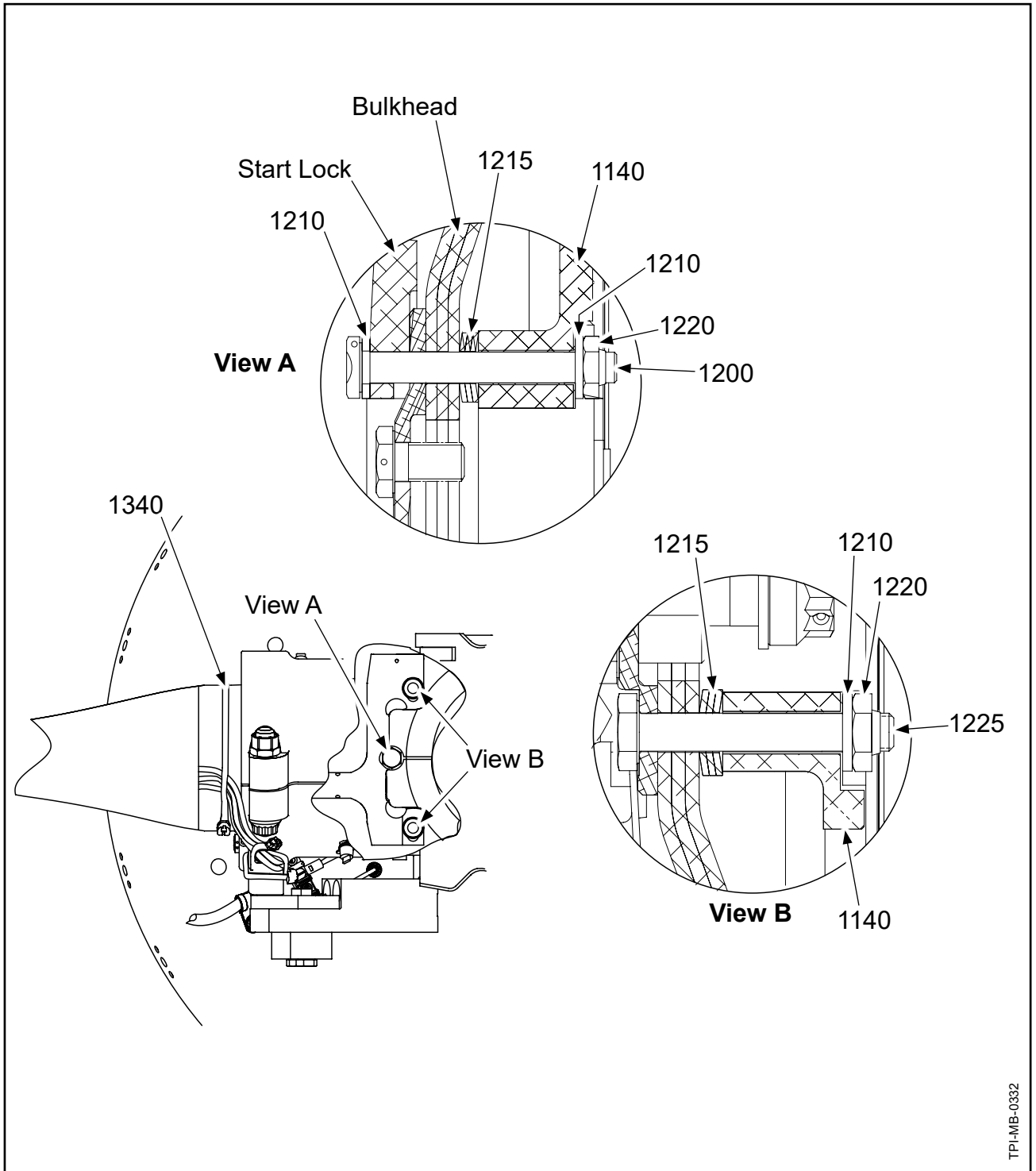
**102441-1 and 102441-2**

DY. Installation Instruction 11DY - continued

- (8) Insert tie strap (1320) through the wire harness bracket (1300) and between the blade clamp and the wire harness tubing as shown in Figure DY-3.
  - (a) Do not tighten the tie strap (1320).
- (9) Insert tie strap (1330) through the loop in the wire harness (890) as shown in Figure DY-3.
  - (a) Do not tighten the tie strap (1320).
- (10) Adjust the wire harness (890) so that the dimensional requirement shown in Figure DY-3 is met, then tighten tie strap (1320).
- (11) Tighten tie strap (1330) around the wire harness (890) and the de-ice boot leads.
  - (a) Position the head of the tie strap (1330) in accordance with Figure DY-3.
- (12) Install tie strap (1340) around the blade shank/de-ice boot leads and position the head of the tie strap in accordance with Figure DY-1.
- (13) Install the lead wires from the slip ring (1140) and the lead wires from the wire harness (890) to the terminal strip (170) in accordance with Figure DY-4.
  - (a) Position the ring terminals as shown in Figure DY-4.
  - (b) Install the terminal screws and washers as shown in Figure DY-4.
  - (c) Tighten the terminal screws until snug.
- (14) Install the loop clamp (660) around the wire harness (890) then position the clamp parallel to the terminal strip (170) as shown in Figure DY-5.
- (15) Using screw (690), washer (680), and nut (670), attach the loop clamp (660) to the bulkhead in accordance with Figure DY-5.
  - (a) Torque the screw (690) to 22-25 In-Lb (2.4-2.8 N•m)
- (16) Cycle the propeller from feather angle to reverse angle to verify correct wire harness installation. Make sure the wire harness is not blocked during cycling.

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

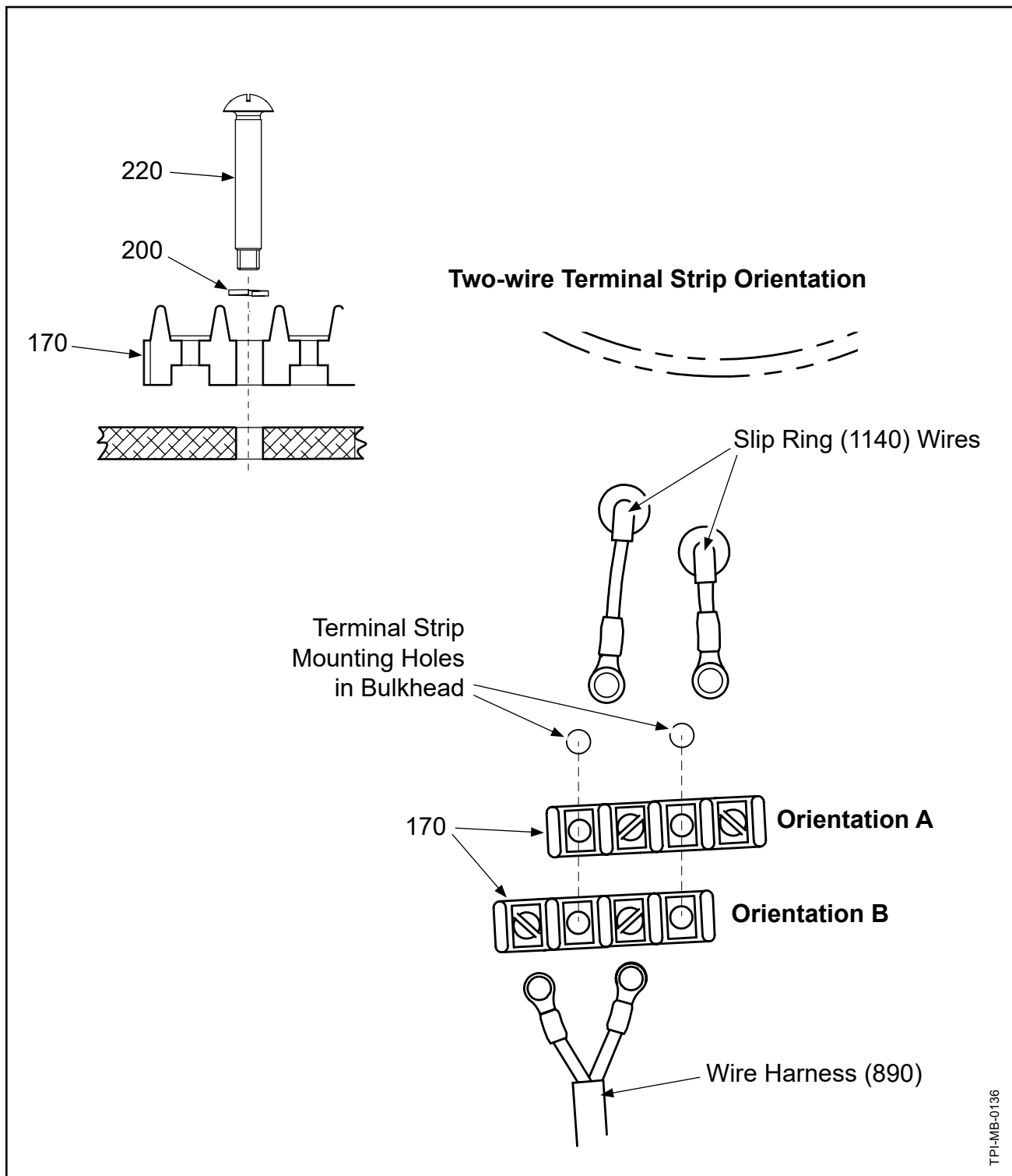
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**102441-1 and 102441-2**



**Slip Ring Mounting  
Figure DY-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

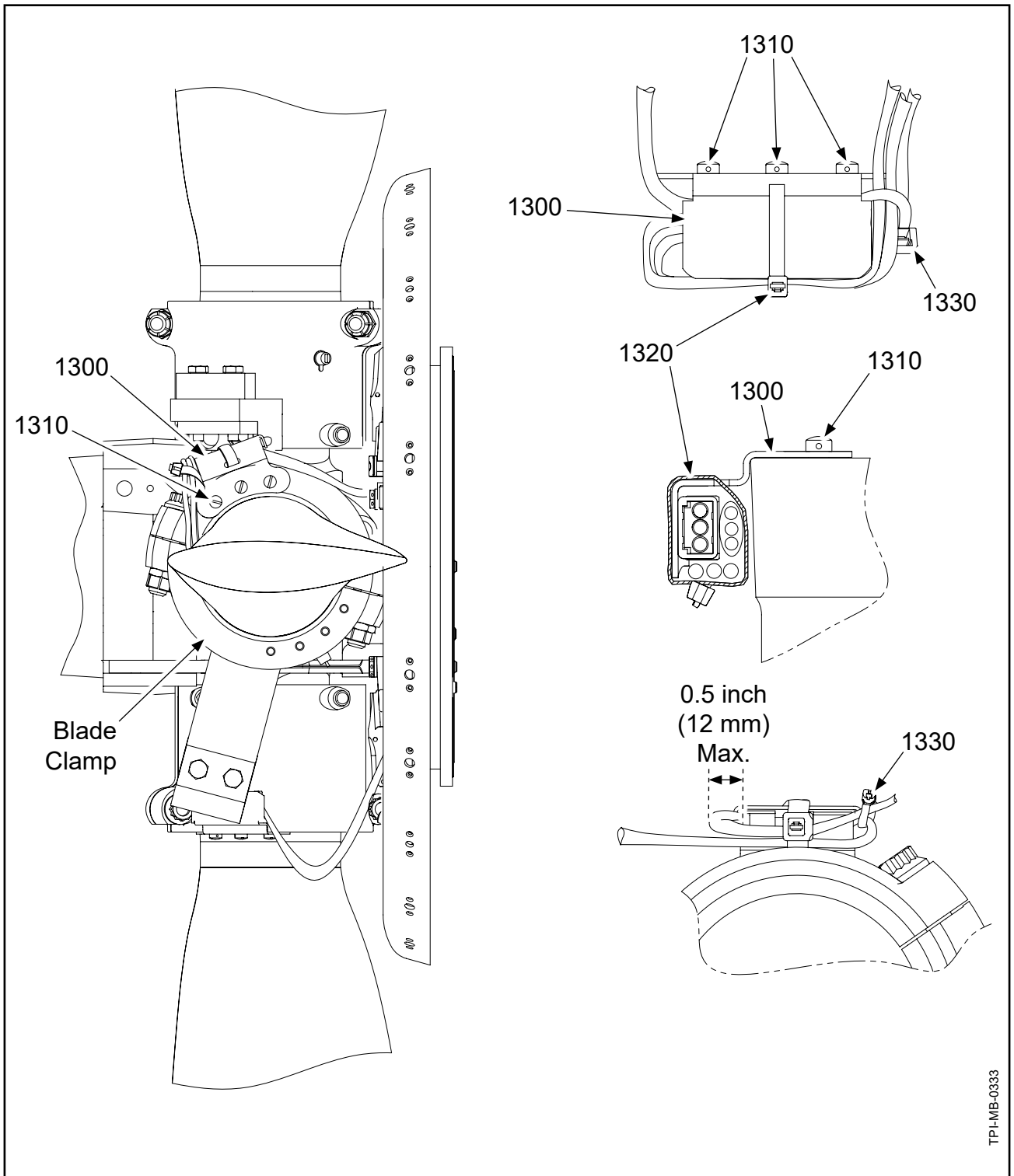
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**102441-1 and 102441-2**



**Terminal Strip Installation  
Figure DY-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**102441-1 and 102441-2**



**Wire Harness Bracket Installation**  
**Figure DY-3, page 1 of 2**

HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180

Plug Connection



Step 7

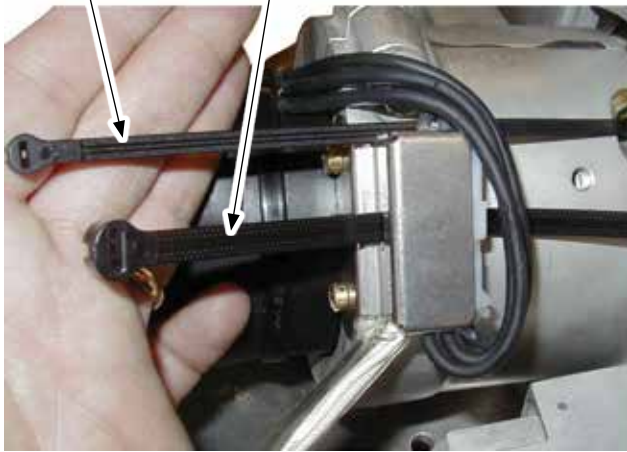
Wire Harness  
Bracket (1300)



Step 7

1330

1320



Steps 8 and 9

1340

1330

1320



Steps 11 and 12

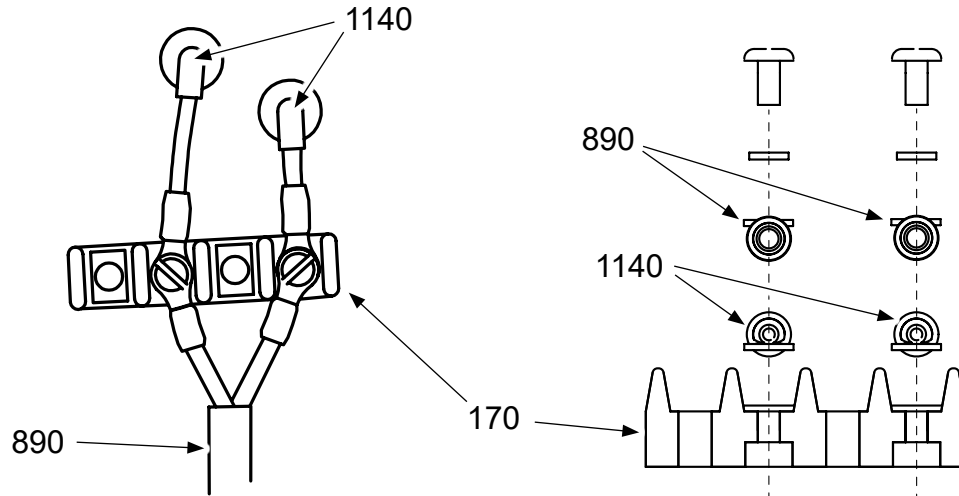
TPI-MB-0344

Wire Harness Bracket Installation  
Figure DY-3, page 2 of 2

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

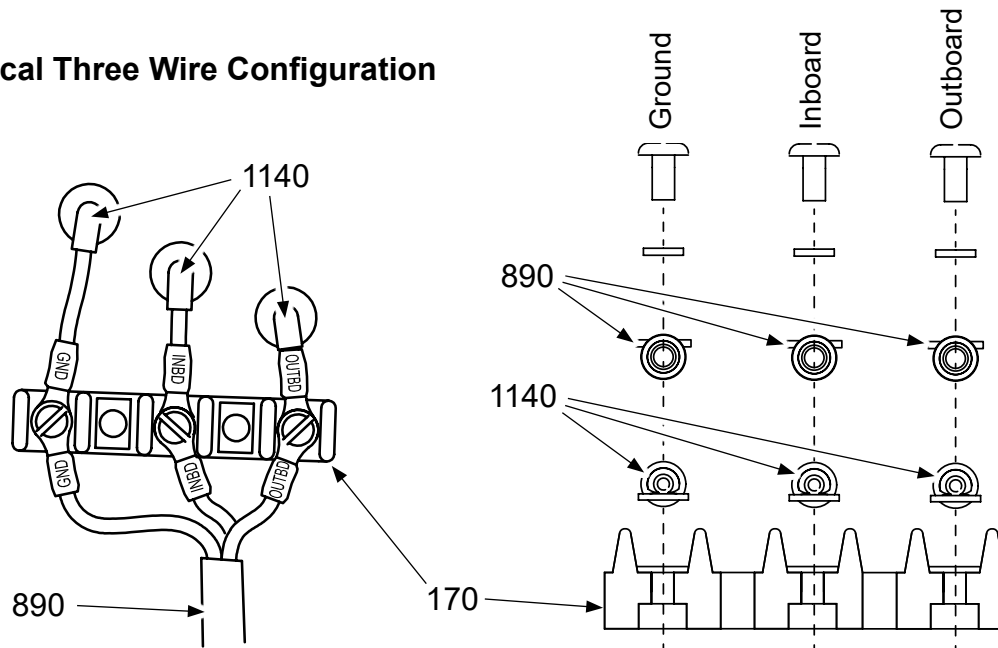
This section includes the parts list(s) and installation instructions for the following electric de-ice kit(s):  
**102441-1 and 102441-2**

## Typical Two-wire Configuration



**NOTE:** The illustrations show slip ring wires on a typical right-hand (rotation) propeller.

## Typical Three Wire Configuration

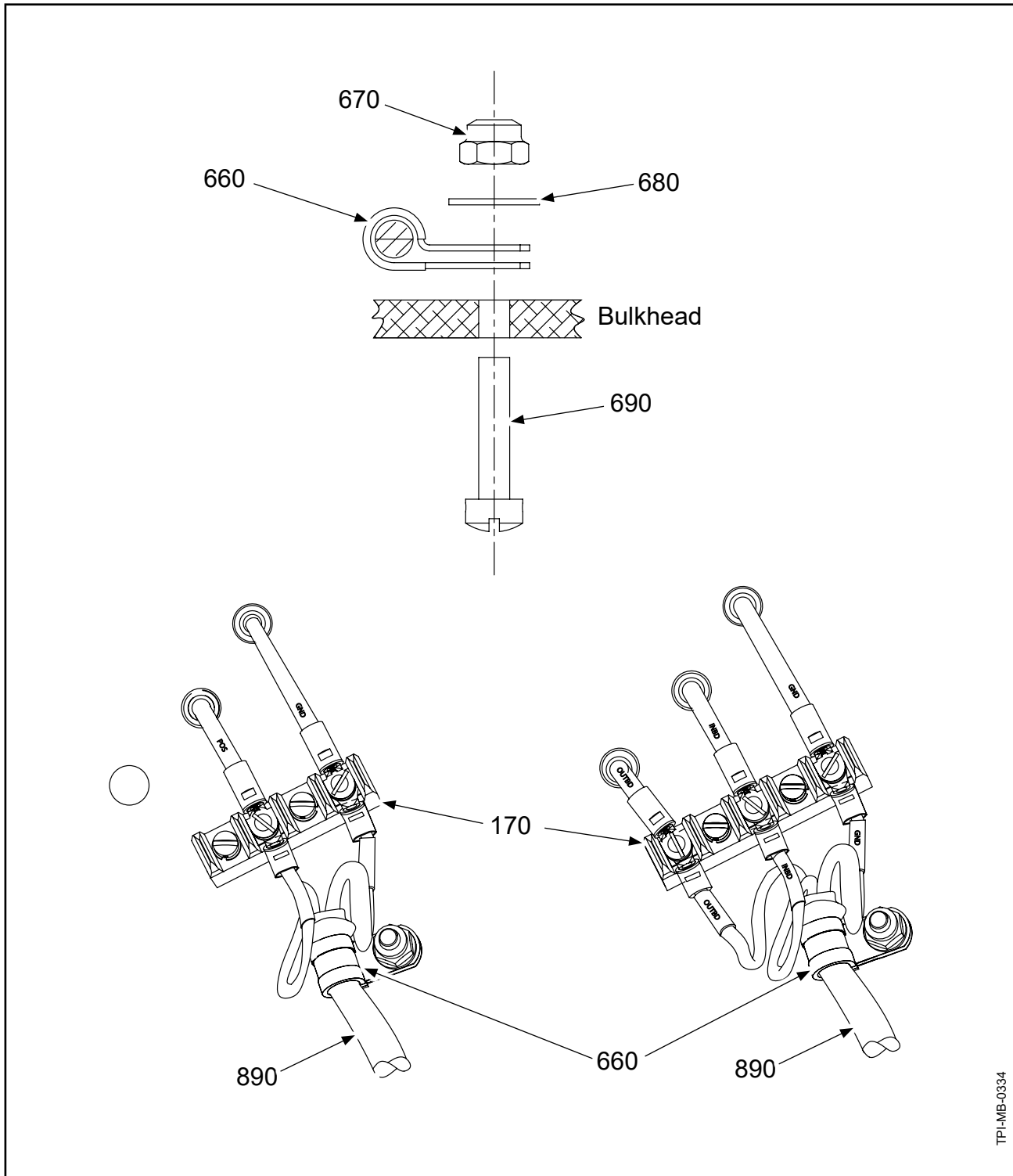


**Terminal Strip Lead Wire Configurations: Bulkhead Mounted  
Figure DY-4**

TP-LMB-0134

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**102441-1 and 102441-2**



**Loop Clamp Installation  
Figure DY-5**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**102441-1 and 102441-2**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>102441-1</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11DY</b> <b>FIGURES: DY-1 thru DY-5</b>		
170	1H1150-2	• TERMINAL BLOCK ASSEMBLY	4	
200	B-3854-41	• WASHER, LOCK	8	Y
220	B-6631-233	• SCREW, 6-32, FILLISTER HEAD, CRES	8	Y
660	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	4	Y
670	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
680	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
690	B-6976-10	• SCREW, 8-32, WASHER HEAD	4	Y
890	H6976-11	• WIRE HARNESS	4	Y
1140	4H1933-7	• SLIP RING ASSEMBLY	1	
1200	B-3384-26H	• BOLT, 1/4-28, HEX HEAD	8	Y
1210	B-3837-0463	• WASHER, CORROSION RESISTANT	20	Y
1215	B-7076-42	• BELLVILLE SPRING WASHER	36	Y
1220	B-3808-4	• NUT, HEX, SELF-LOCKING	12	Y
1225	102831	• BOLT, HEX, 1/4-28, CRS	4	Y
1300	7931-E-6977-11	• BRACKET	4	
1310	B-3840-4	• SCREW	12	Y
1320	B-3852-3-0	• STRAP, TIEDOWN, PLASTIC	4	Y
1330	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	4	Y
1340	B-3852-6-0	• STRAP, TEIDOWN, PLASTIC	4	Y
-2000	H6975-11	• DE-ICE BOOT	4	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 102441-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**102441-1 and 102441-2**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>102441-2</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11DY FIGURES: DY-1 thru DY-5</b>		
170	1H1150-3	• TERMINAL BLOCK ASSEMBLY	4	
200	B-3854-41	• WASHER, LOCK	8	Y
220	B-6631-233	• SCREW, 6-32, FILLISTER HEAD, CRES	8	Y
660	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	4	Y
670	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
680	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
690	B-6976-10	• SCREW, 8-32, WASHER HEAD	4	Y
890	3H2092-2	• WIRE HARNESS	4	Y
1140	4H2448-1	• SLIP RING ASSEMBLY	1	
1200	B-3384-26H	• BOLT, 1/4-28, HEX HEAD	8	Y
1210	B-3837-0463	• WASHER, CORROSION RESISTANT	20	Y
1215	B-7076-42	• BELLVILLE SPRING WASHER	36	Y
1220	B-3808-4	• NUT, HEX, SELF-LOCKING	12	Y
1225	102831	• BOLT, HEX, 1/4-28, CRS	4	Y
1300	7931-E-6977-11	• BRACKET	4	
1310	B-3840-4	• SCREW	12	Y
1320	B-3852-3-0	• STRAP, TIEDOWN, PLASTIC	4	Y
1330	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	4	Y
1340	B-3852-6-0	• STRAP, TEIDOWN, PLASTIC	4	Y
-2000	4H2200-21	• DE-ICE BOOT	4	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 102441-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**107556**

**DZ.    Installation Instruction 11DZ**

- (1) Using the screw (220), washers (200 and 210), tapped eyelet (190), attach the terminal strip (170) to the bulkhead in accordance with Orientation B shown in Figure DZ-1.
  - (a) Torque the screw (220) to 10 - 12 In-Lb (1.2 - 1.3 N•m).
- (2) Using the screws (1170) and the existing bulkhead spacers (if applicable), attach the slip ring (1140) and the bulkhead to the hub in accordance with Figure DZ-2.
  - (a) Torque each screw (1170) to 8-10 Ft-Lbs (10.9-13.5 N•m).
  - (b) For propellers with existing bulkhead spacers only, wait five minutes after torquing the screws (1170), then re-torque each screw (1170) to 8-10 Ft-Lbs (10.9-13.5 N•m).
- (3) Complete a slip ring run-out check in accordance with the Check chapter of this manual.
- (4) Put the propeller blades at reverse blade angle.
- (5) If required, press the spring pin (905) perpendicularly into the hole in the counterweight as shown in Figure DZ-3.
  - (a) The spring pin (905) must extend to a height of 0.170 - 0.210 inch (4.32 - 5.33 mm).

**NOTE:**    The counterweight may have been drilled for the spring pin (905) or may have an integral (cast) pin in place of the spring pin.

- (6) Assemble the plug connection between the wire harness (890) and the de-ice boot.
- (7) Install the wire harness/de-ice boot plug connections in the groove in the counterweight against the spring pin (905) or integral cast pin as shown in Figure DZ-4.
- (8) Install the tie strap (910) in the retaining grooves of the counterweight and around the counterweight, and between the wires of the wire harness/de-ice boot plug connection as shown in Figure DZ-4.

**CAUTION:**    ROUTING THE TIE STRAP (910) INCORRECTLY CAN CAUSE AN ELECTRICAL SHORT IN THE DE-ICE SYSTEM.

- (a) On the boot-side of the plug connection, install the tie strap (910) over pin location 3 on the connector as shown in Figure DZ-4.
- (b) On the wire harness-side of the plug connection, install the tie strap (910) between wire 1 and wire 2 as shown in Figure DZ-4.
- (c) Position the head of tie strap (910) in the approximate location shown in Figure DZ-4.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**107556**

**DZ.**    Installation Instruction 11DZ - continued

- (9) Using the tie strap (930), attach the de-ice boot lead wires to the tie strap (910) as shown in Figure DZ-4.
- (10) Install the tie strap (920) around the blade shank and over the de-ice boot lead wires as shown in Figure DZ-4.
  - (a) The head of tie strap (920) must be located at the trailing edge of the blade as shown in Figure DZ-5.
- (11) Install the clamp (660), around the wire harness (890) and position against the O-ring as shown in Figure DZ-6.
- (12) Position the clamp (660) so that the gap between the O-ring and the hub surface is within the dimension specified in Figure DZ-6.
- (13) Apply threadlocker CM399 to the threads of the screw (650).
- (14) Using screw (650) and washers (630), install the clamp (660) to the counterweight in accordance with Figure DZ-6.
  - (a) Torque the screw (650) to 20-22 In-Lb (2.3-2.4 N•m).
- (15) Install the wire harness bracket (1300) and washers (1305) on the the hub clamping bolt in accordance with Figure DZ-7.
  - (a) Install one washer (1305) between the head of the hub clamping bolt (1315) and the hub.
  - (b) Install one washer (1305) between the wire harness bracket (1300) and the hub.
  - (c) Position the wire harness bracket (1300) with the centerline directed toward the ground ("GND") slip ring lead wire as shown in Figure DZ-8.
  - (d) Install the hub clamping nut.
  - (e) Torque the hub clamping nut to 20-22 Ft-Lb (28-29 N•m).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**107556**

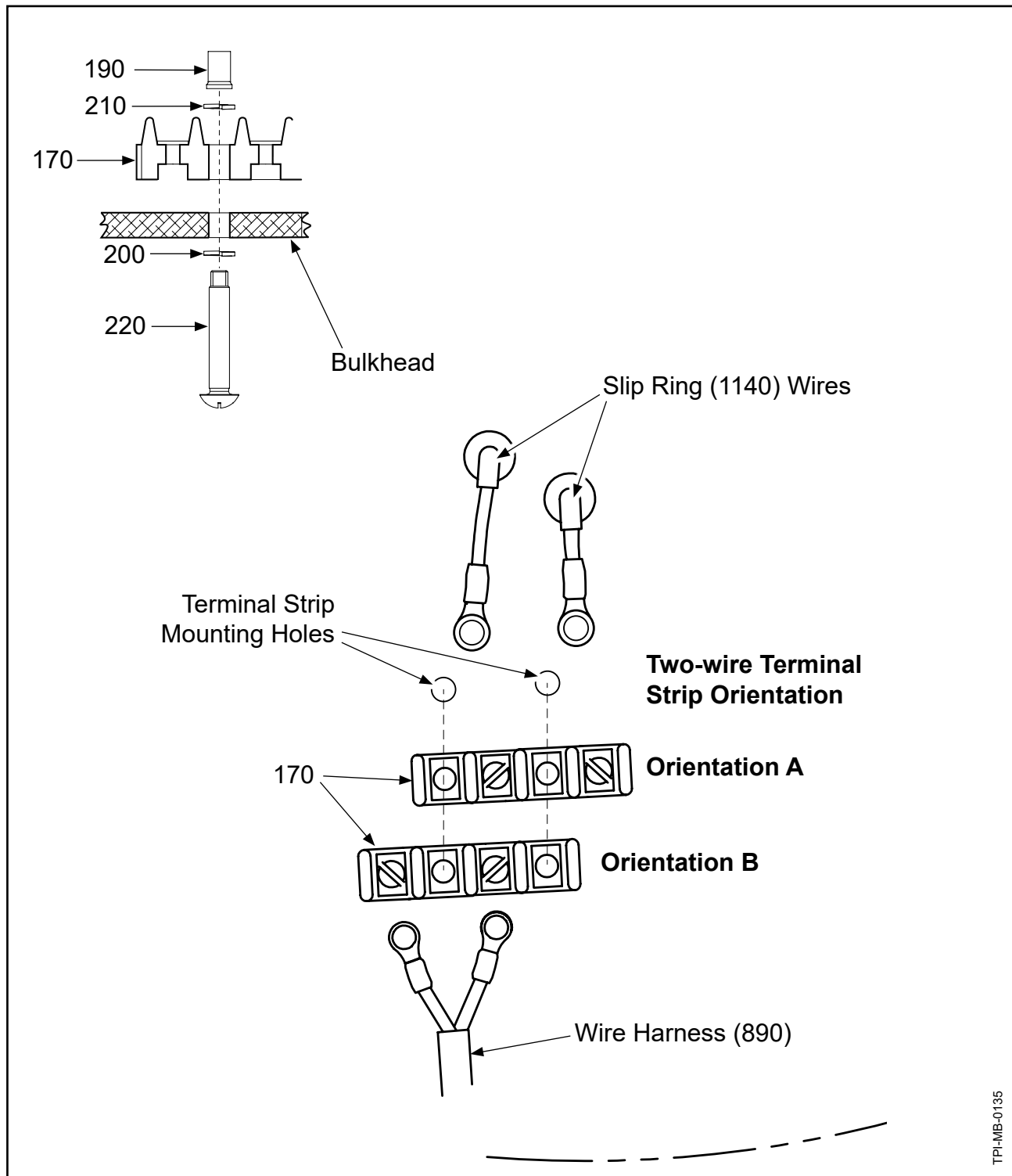
**DZ.**    Installation Instruction 11DZ - continued

- (16) Attach the de-ice boot wire harness (890) to the wire harness bracket (1300) as shown in Figure DZ-8.
  - (a) Position the wire harness (890) on the bracket (1300) with the O-ring off the edge of the bracket as shown in Figure DZ-8.
  - (b) Attach the wire harness (890) to the bracket (1300) with the tie straps (840). Twisting of the lead wires is not permitted.
- (17) Attach the slip ring lead wires and de-ice wire harness (890) to the terminal strip (170) in accordance with Figure DZ-8.
  - (a) Route the wire harness (890) as shown in Figure DZ-8
  - (b) Tighten the terminal screws until snug.
  - (c) Using one tie strap (930), attach the lead wires from the wire harness (890) to the ground ("GND") slip ring lead wire as shown in Figure DZ-8
- (18) Cycle the propeller blades from reverse angle to feather angle to verify proper wire harness installation.
  - (a) Make sure the wire harness is not blocked during cycling.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**107556**



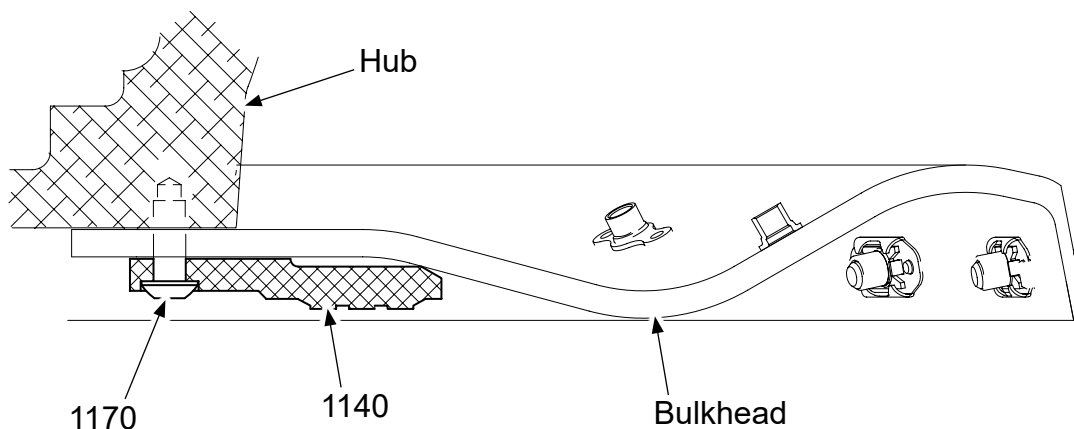
**Terminal Strip Hardware Configuration: Bulkhead Mounted  
Figure DZ-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

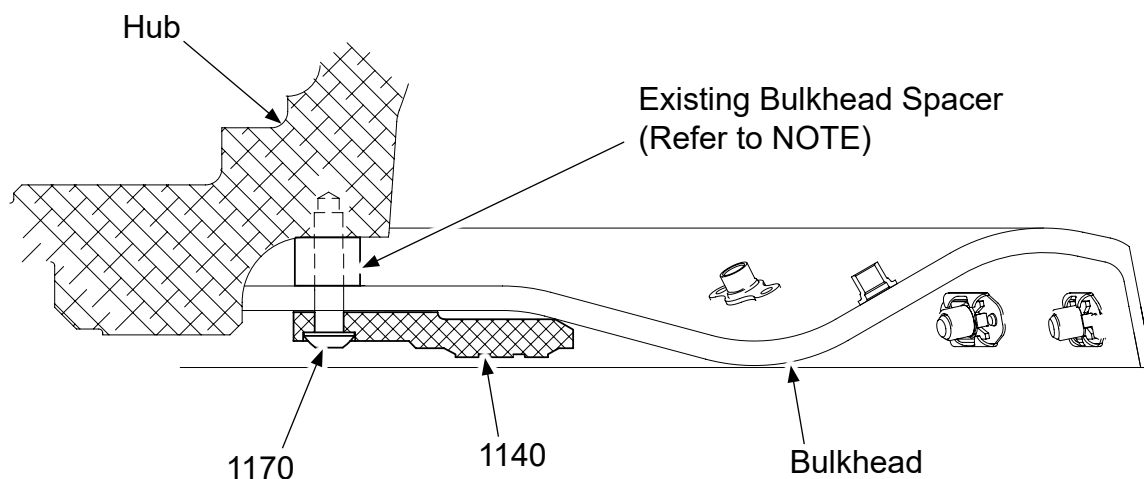
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**107556**

**Typical Slip Ring Installation (without bulkhead spacer)**



**Typical Slip Ring Installation (with bulkhead spacer)**



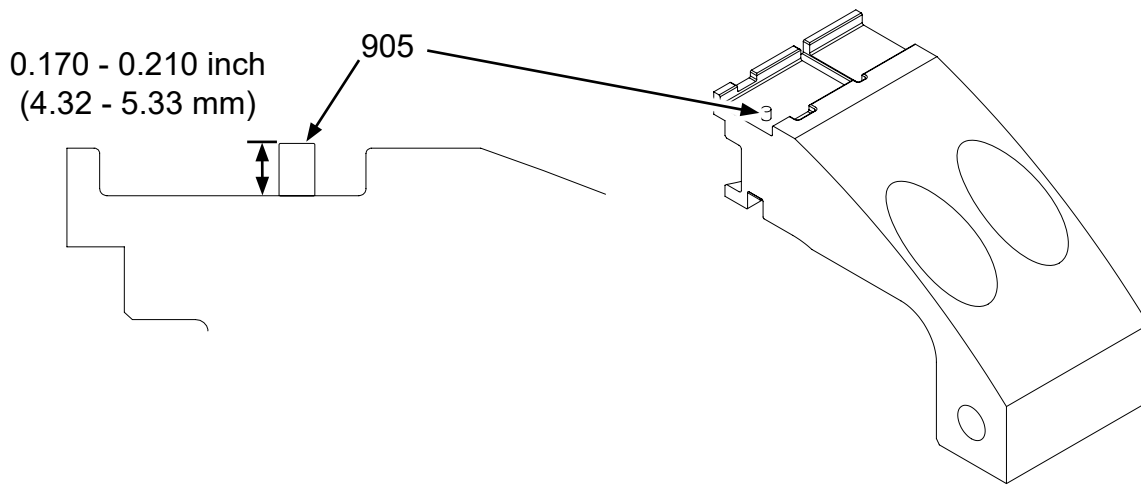
**NOTE:** The bulkhead spacer is a spinner mounting component and is application specific. Refer to Hartzell Propeller Application Guide Manual 159 (61-02-59).

TPI-MB-0204, TPI-MB-0223

**Slip Ring Mounting  
Figure DZ-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**107556**



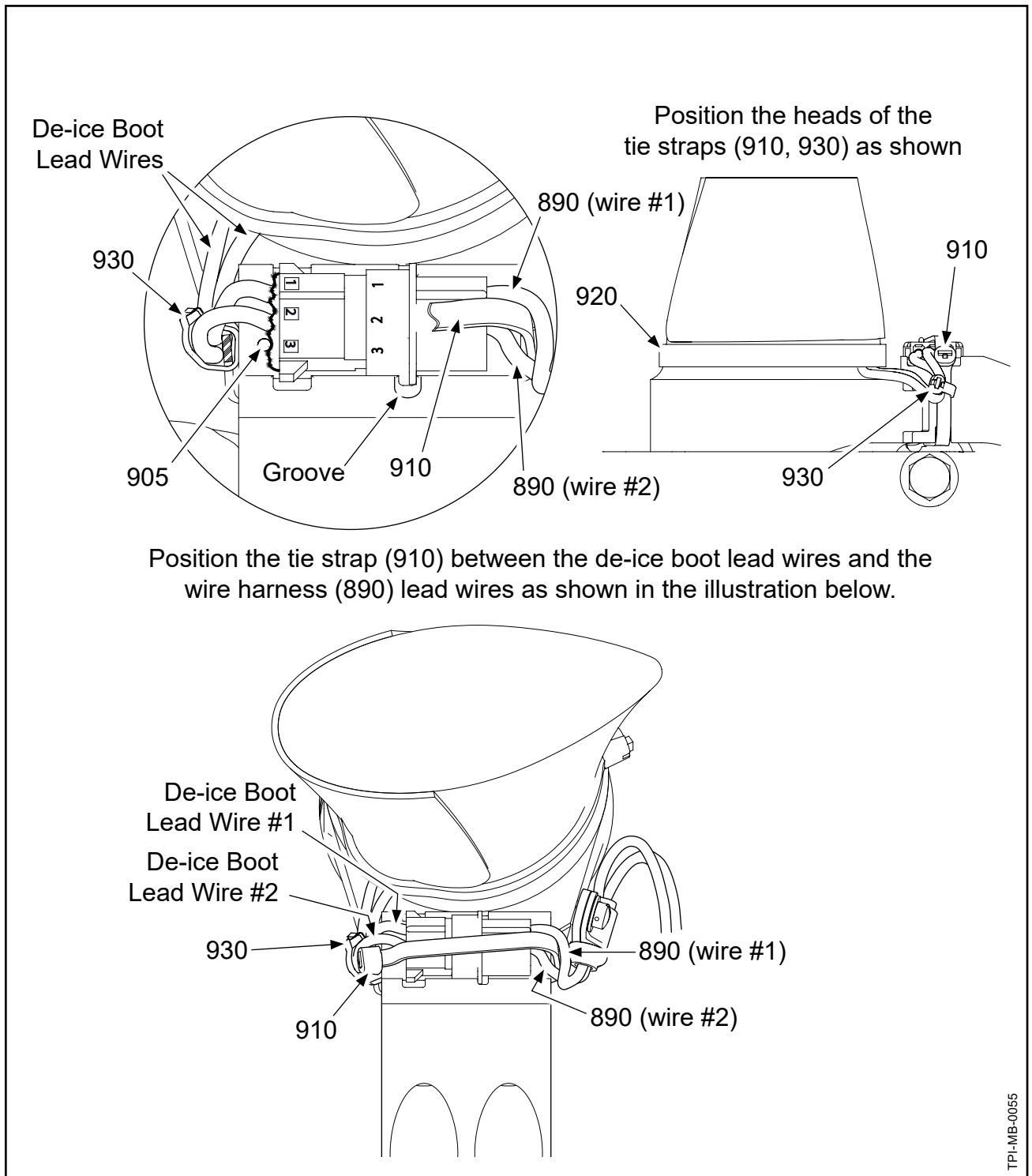
TPI-MB-0078

**Spring Pin Height  
Figure DZ-3**



# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions for the following electric de-ice kit(s):  
**107556**

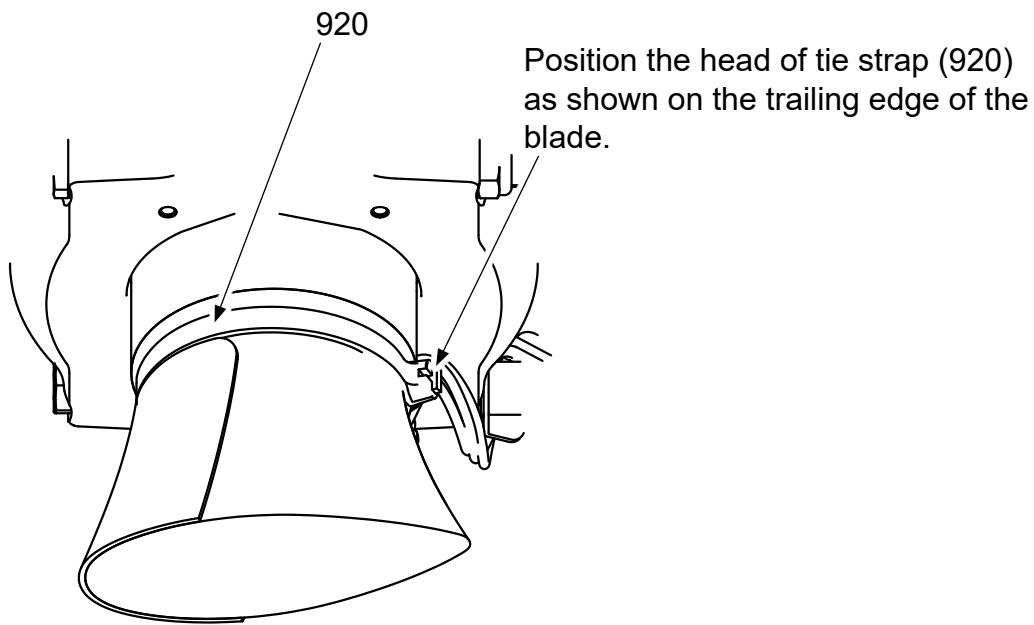


**Wire Harness to Blade Shank/Counterweight  
Figure DZ-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**107556**

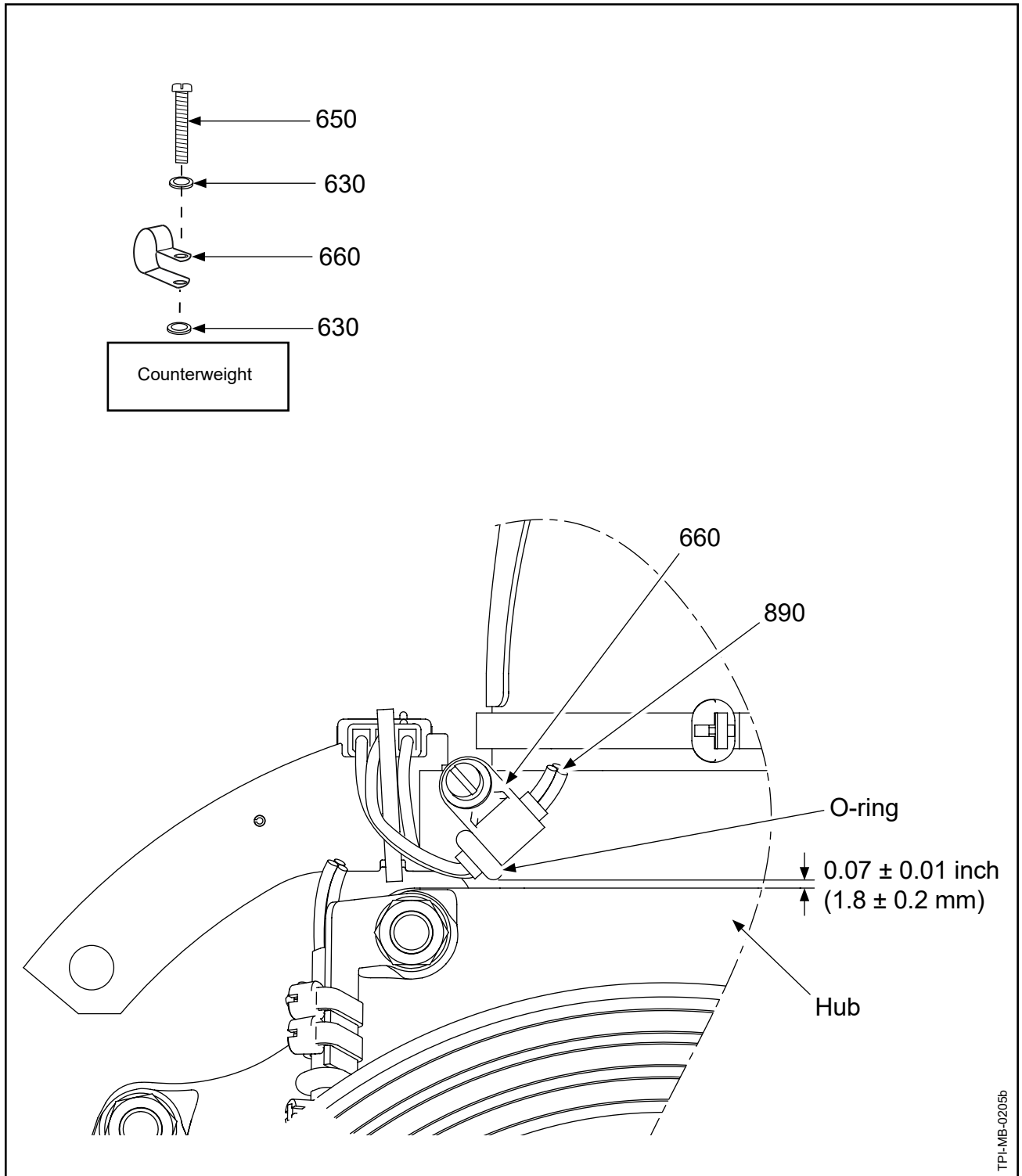


TI-180100155

**Wire Harness to Blade Shank  
Figure DZ-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**107556**

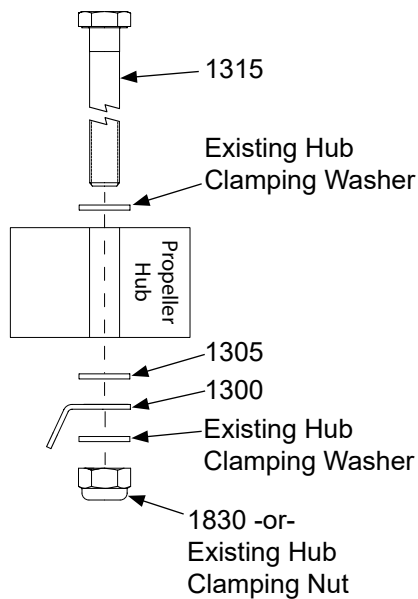


**Loop Clamp Orientation  
Figure DZ-6**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

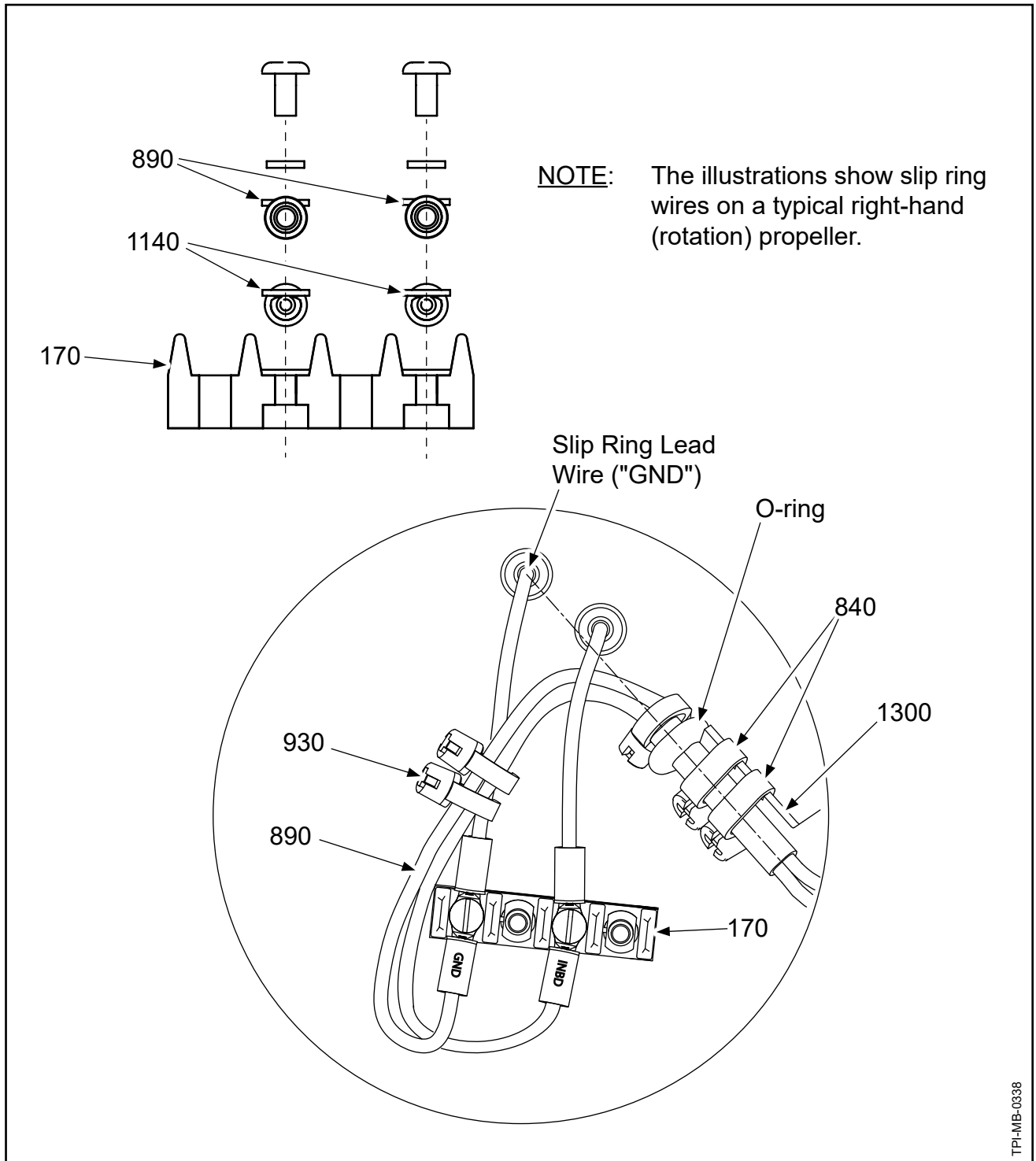
**107556**



**Wire Harness Bracket Hardware Configuration  
Figure DZ-7**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**107556**



**Terminal Strip Connection/Wire Harness Bracket Alignment  
Figure DZ-8**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**107556**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>107556</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11CY</b> <b>FIGURES: DZ-1 thru DX-8</b>		
170	1H1150-3	• TERMINAL STRIP	5	
190	2H1365	• TAPPED EYELET	10	Y
200	B-3854-41	• WASHER, LOCK	10	Y
210	B-3854-41	• WASHER, LOCK	10	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	10	Y
630	B-3837-0332	• WASHER, CORROSION RESISTANT	10	Y
645	B-3855-32	• DELETED	-	
650	B-3840-7	• SCREW, 10-32, FILLISTER HEAD	5	Y
660	B-3853-F5	• CLAMP, LOOP, PLASTIC	5	Y
840	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	10	Y
890	106051	• WIRE HARNESS	5	Y
905	B-3842-0437	• SPRING PIN, 3/32", CRES	5	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	5	Y
920	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	5	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	10	Y
1140	107500	• SLIP RING ASSEMBLY	1	
1170	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	10	Y
1300	105558	• BRACKET, WIRE HARNESS	5	
1305	B-3834-0663	• WASHER	5	Y
1315	102691	• BOLT, 3/8-24, HEX HEAD	5	

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 107556**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the installation instructions and parts list(s)  
for the following electric de-ice kit(s):  
**107570**

**EA. Installation Instruction 11EA**

- (1) Using the screw (220), washers (200 and 210), tapped eyelet (190), attach the terminal strip (170) to the bulkhead in accordance with Figure EA-1.
  - (a) Torque the screw (220) to 10-12 In-Lb (1.2-1.3 N•m).
- (2) Using the screws (1170), attach the slip ring (1140) and the bulkhead to the hub as shown in Figure EA-2.
  - (a) Torque each screw (1170) 8-10 Ft-Lb (10.9-13.5 N•m).
- (3) Complete a slip ring run-out check in accordance with the Check chapter of this manual.
- (4) Put the propeller blades at reverse blade angle.
- (5) If required, press the spring pin (905) perpendicularly into the hole in the counterweight as shown in Figure EA-3.
  - (a) The spring pin (905) must extend to a height of 0.170-0.210 inch (4.32-5.33 mm).

**NOTE:** The counterweight may have been drilled for the spring pin (905) or may have an integral (cast) pin in place of the spring pin.

- (6) Assemble the plug connection between the wire harness (890) and the de-ice boot.
- (7) Install the wire harness/de-ice boot plug connections in the groove in the counterweight against the spring pin (905) or integral cast pin as shown in Figure EA-4.
- (8) Install the tie strap (910) in the retaining grooves of the counterweight and around the counterweight and between the wires of the wire harness/de-ice boot plug connection as shown in Figure EA-4.

**CAUTION:** ROUTING THE TIE STRAP (910) INCORRECTLY CAN CAUSE AN ELECTRICAL SHORT IN THE DE-ICE SYSTEM.

- (a) On the boot-side of the plug connection: install the tie strap (910) between wire 2 and wire 3 as shown in Figure EA-4.
- (b) On the wire harness-side of the plug connection: install the tie strap (910) between wire 1 and wire 2 as shown in Figure EA-4.
- (c) Position the head of tie strap (910) in approximate location shown in Figure EA-4.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**107570**

**EA. Installation Instruction 11EA - continued**

- (9) Using the tie strap (930), secure the de-ice boot lead wires to the tie strap (910) as shown in Figure EA-4.
- (10) Install the tie strap (920) around the blade shank and over the de-ice boot lead wires as shown in Figure EA-4.
  - (a) The head of tie strap (920) must be located at the trailing edge of the blade as shown in Figure EA-5.
- (11) Install the clamp (660), around the wire harness (890) and position it against the O-ring as shown in Figure EA-6.
- (12) Apply threadlocker CM399 to the threads of the screw (650).
- (13) Using screw (650) and washers (630), install the clamp (660) to the counterweight in accordance with Figure EA-6.
  - (a) Align the clamp (660) so that there is  $0.07 \pm 0.01$  inch ( $1.8 \pm 0.2$  mm) clearance between the O-ring and the hub as shown in Figure EA-6.
  - (b) Torque the screw (650) to 20-22 In-Lb (2.3-2.4 N•m).
- (14) Install the wire harness bracket (1300), washers (1305), existing hub clamping washer, and existing hub clamping nut onto the the hub clamping bolt (1315) in accordance with Figure EA-7.
  - (a) Position the wire harness bracket (1300) with the centerline directed toward the ground ("GND") slip ring lead wire as shown in Figure EA-8.
  - (b) Torque the hub clamping nut to 20-22 Ft-Lb (28-29 N•m).
    - 1 A minimum of one thread must be visible above the hub clamping nut after it is torqued.
- (15) Put the wire harness (890) on the wire harness bracket (1300) with the O-ring off of the edge of the bracket as shown in Figure EA-8.

**CAUTION:** TWISTING OF THE LEAD WIRES BETWEEN THE CLAMP (660) AND THE WIRE HARNESS BRACKET (1300) IS NOT PERMITTED.

- (a) Attach the wire harness (890) to the wire harness bracket (1300) with two tie straps (840) as shown in Figure EA-8.
- (16) Route the lead wires from the wire harness (890) to the terminal strip (170) in accordance with Figure EA-8.



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**107570**

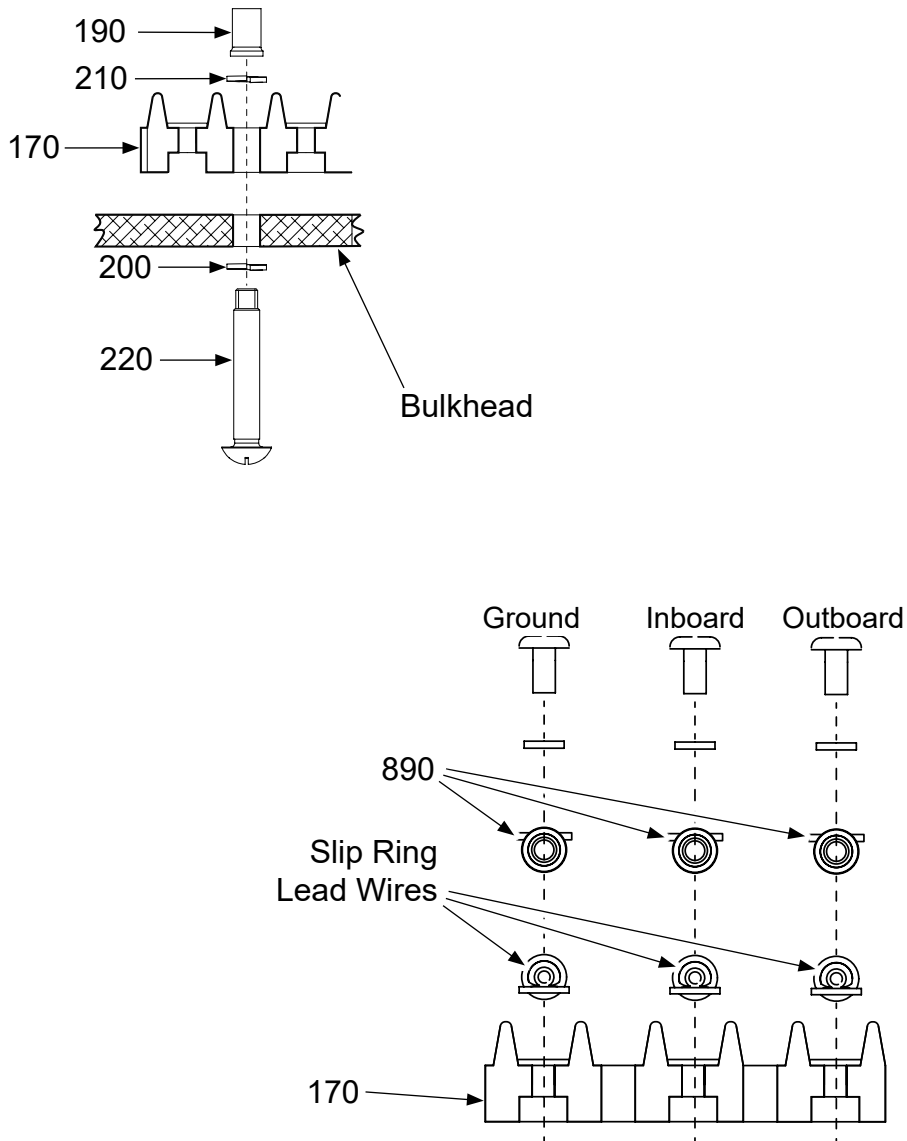
EA. Installation Instruction 11EA - continued

- (17) Attach the slip ring lead wires and the lead wires from the wire harness (890) to the terminal strip (170) in accordance with Figure EA-1 and Figure EA-8.
  - (a) Using one tie strap (930), attach the lead wires from the wire harness (890) to the ground ("GND") slip ring lead wire as shown in Figure EA-8.
  - (b) Tighten the terminal strip screws until snug.
- (18) Cycle the propeller blades from reverse angle to feather angle to verify proper wire harness installation. Make sure the wire harness is not blocked during cycling.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**107570**



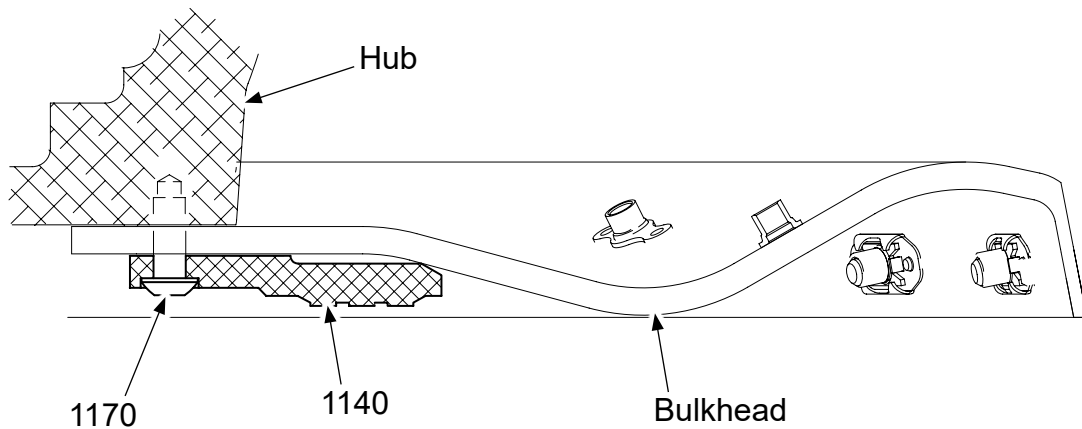
**NOTE:** The illustrations show slip ring wires on  
a typical right-hand (rotation) propeller.

TP-LMB-0139

**Terminal Strip Hardware Configuration: Bulkhead Mounted  
Figure EA-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**107570**

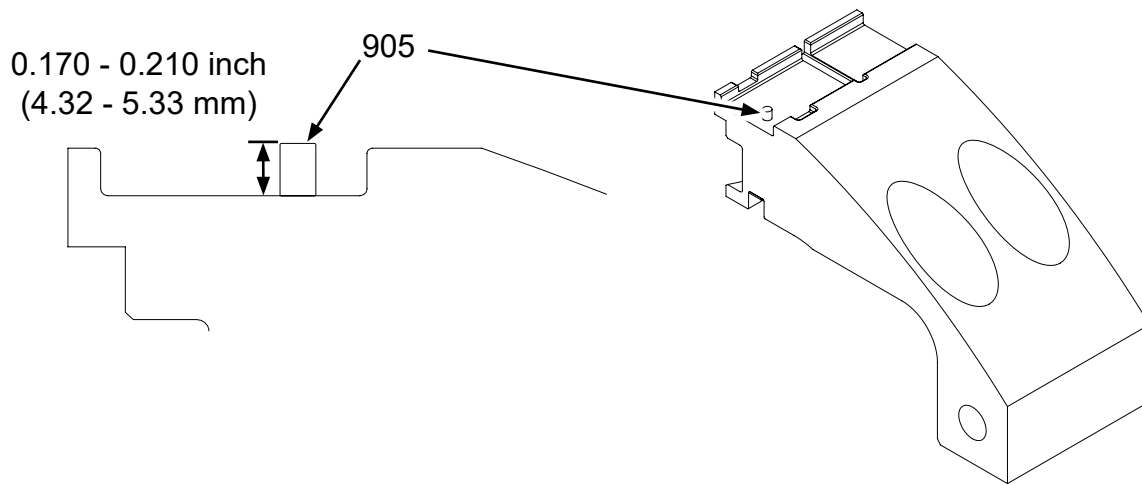


TPI-MB-0223

**Slip Ring Mounting  
Figure EA-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**107570**



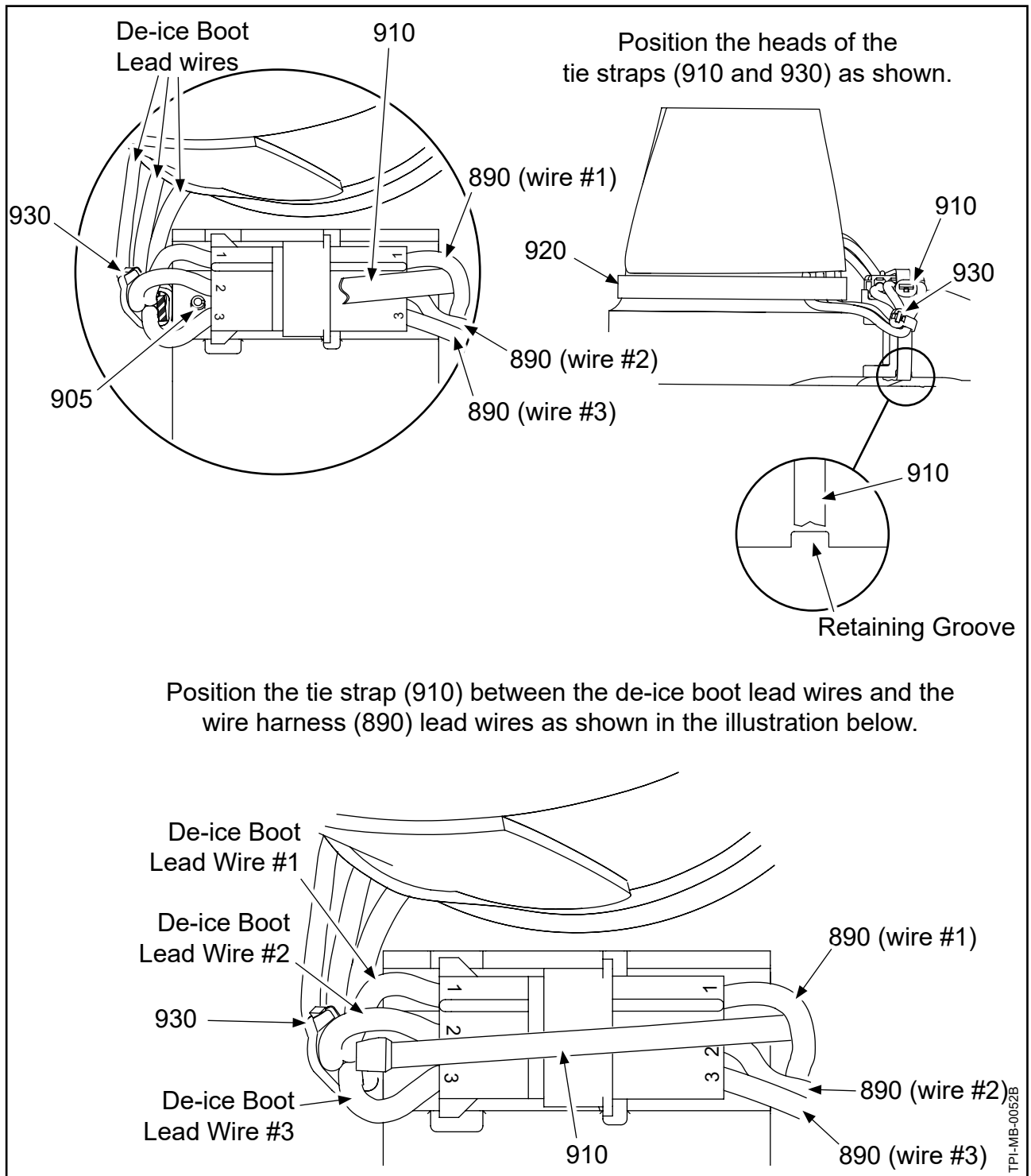
TPI-MB-0078

**Spring Pin Height  
Figure EA-3**

# **HARTZELL ICE PROTECTION SYSTEM MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

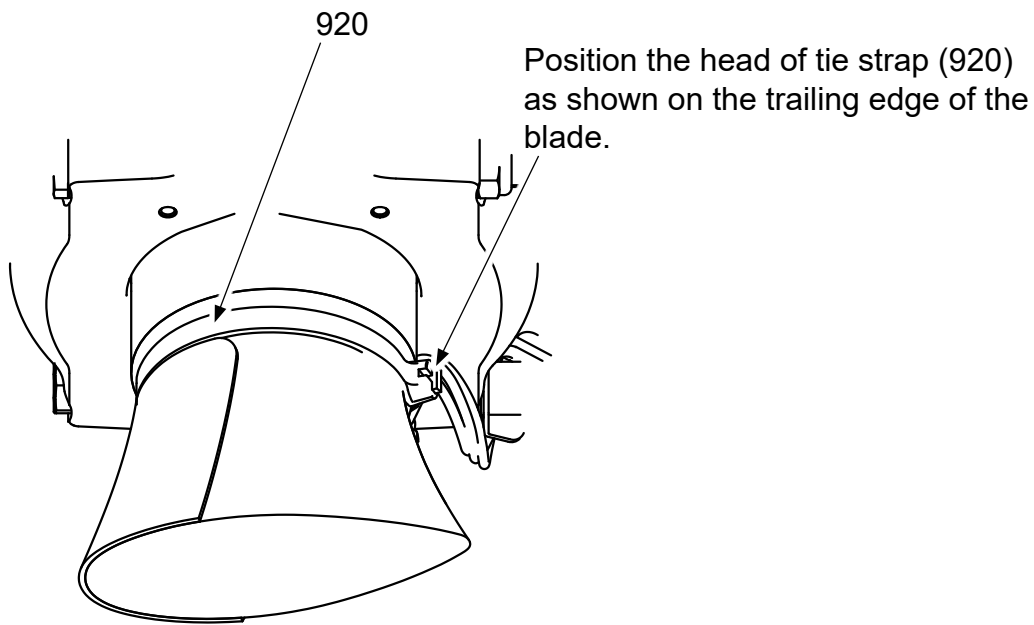
**107570**



**Wire Harness to Blade Shank/Counterweight  
Figure EA-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**107570**

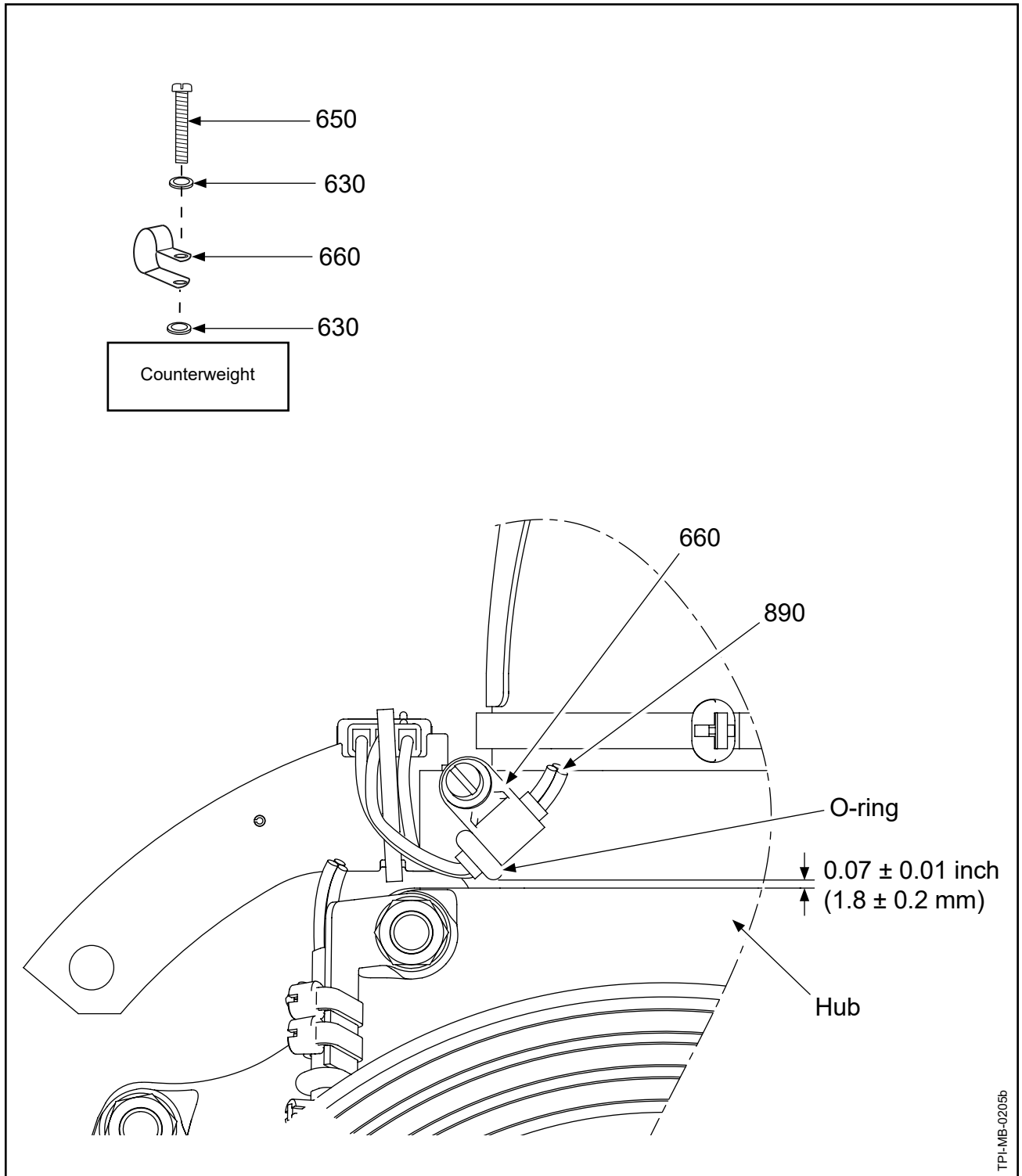


TI-180100155

**Wire Harness to Blade Shank  
Figure EA-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

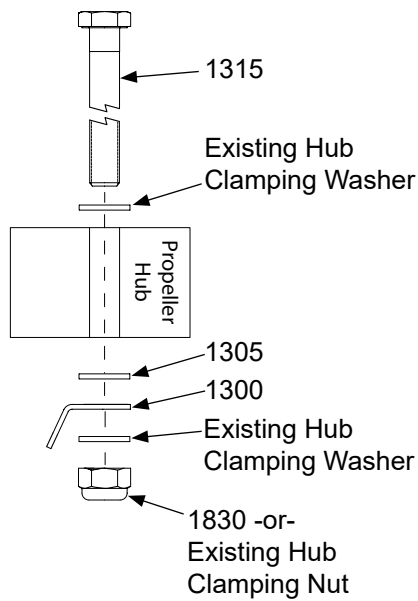
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**107570**



**Loop Clamp Orientation  
Figure EA-6**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**107570**



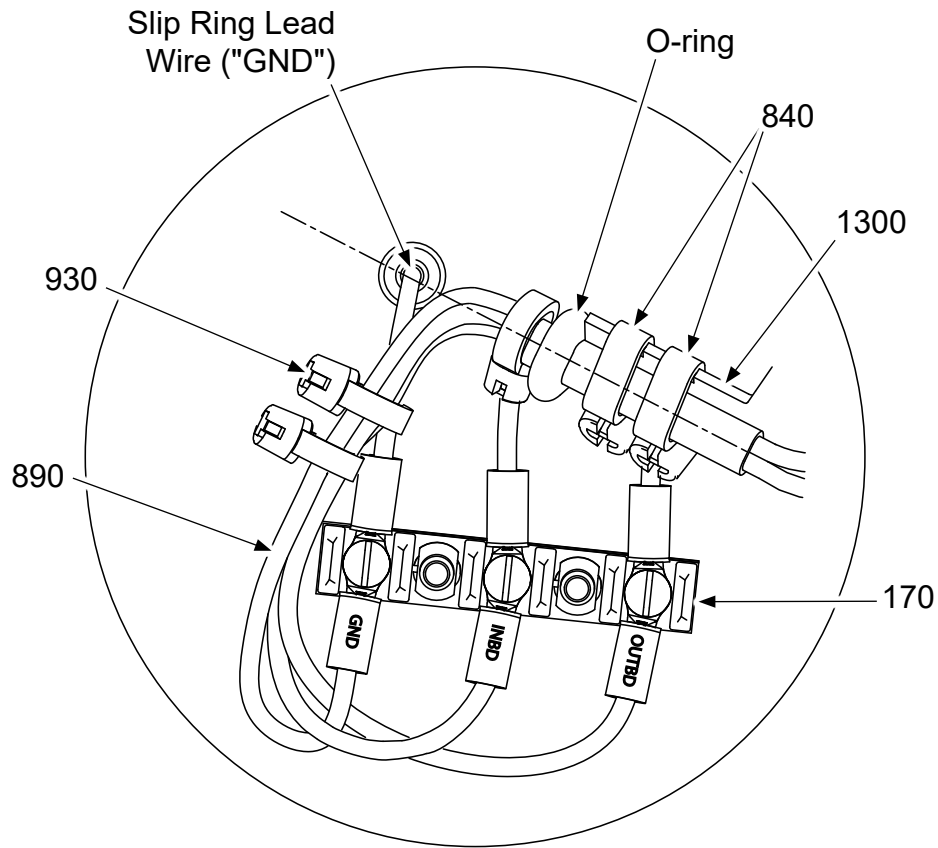
**Wire Harness Bracket Hardware Configuration  
Figure EA-7**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**107570**



**Terminal Strip Connection/Wire Harness Bracket Alignment  
Figure EA-8**

TPI-MB-0338

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the installation instructions and parts list(s)  
for the following electric de-ice kit(s):  
**107570**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>107570</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11EA</b> <b>FIGURES: EA-1 thru EA-8</b>		
170	1H1150-2	• TERMINAL STRIP	5	
190	2H1365	• TAPPED EYELET	10	Y
200	B-3854-41	• WASHER, LOCK	10	Y
210	B-3854-41	• WASHER, LOCK	10	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	10	Y
630	B-3837-0332	• WASHER, CORROSION RESISTANT	10	Y
645	B-3855-32	• DELETED	-	
650	B-3840-7	• SCREW, 10-32, FILLISTER HEAD	5	Y
660	B-3853-F5	• CLAMP, LOOP, PLASTIC	5	Y
840	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	10	Y
890	105555	• WIRE HARNESS	5	Y
905	B-3842-0437	• SPRING PIN, 3/32", CRES	5	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	5	Y
920	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	5	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	10	Y
1140	107533	• SLIP RING ASSEMBLY	1	
1170	A-2070-11	• SCREW, 1/4-28, BUTTON HEAD	10	Y
1300	105558	• BRACKET, WIRE HARNESS	5	
1305	B-3834-0663	• WASHER	5	Y
1315	102691	• BOLT, 3/8-24, HEX HEAD	5	

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 107570**

This section includes the installation instructions and parts list(s)  
for the following electric de-ice kit(s):

**107608**

EB. Installation Instruction 11EB

- (1) Using the screws (220), washers (200), and tapped eyelets (190), attach the terminal strips (170) to the slip ring (1140) in accordance with Figure EB-1.
  - (a) Torque the screws (220) to 10-12 In-Lb (1.2-1.3 N•m).
- (2) Using the screws (1170), attach the slip ring (1140) to the hub as shown in Figure EB-2.
  - (a) Torque each screw (1170) 8-10 Ft-Lb (10.9-13.5 N•m).
- (3) Complete a slip ring run-out check in accordance with the Check chapter of this manual.
- (4) Remove the nut from the hub clamping bolt that will be used to install the wire harness bracket (1300). Refer to Figure EB-3 for the location of the hub clamping bolt.
- (5) Using the existing hub clamping bolt, washer, and nut, install the wire harness bracket (1300) with the existing washer between the wire harness bracket and the hub as shown in Figure EB-4.
  - (a) Position the centerline of the wire harness bracket (1300) to align with the terminal strip mounting screw (220) that is located between the Ground and Inboard terminals on the terminal strip (170) as shown in Figure EB-4.
  - (b) Torque the hub clamping nut to 20-24 Ft-Lbs. (27.2-32.5 N•m).
- (6) Put the propeller blades at low blade angle.
- (7) Assemble the plug connection between the wire harness (890) and the de-ice boot.
  - (a) Install one tie strap (930) around the wire harness/de-ice boot plug connection as shown in Figure EB-5, but do not tighten.
- (8) Route the terminal end of the wire harness (890) through the hole in the counterweight web as shown in Figure EB-5.
- (9) Position the wire harness (890) with the O-ring at the edge of the counterweight web as shown in Figure EB-5.
- (10) Install two tie straps (910) under the tie strap (930) and over the shrink tubing of the wire harness (890).
  - (a) Position the heads of the tie straps (910 and 930) as shown in Figure EB-5, then tighten the tie straps.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the installation instructions and parts list(s)  
for the following electric de-ice kit(s):

**107608**

**EB. Installation Instruction 11EB, continued**

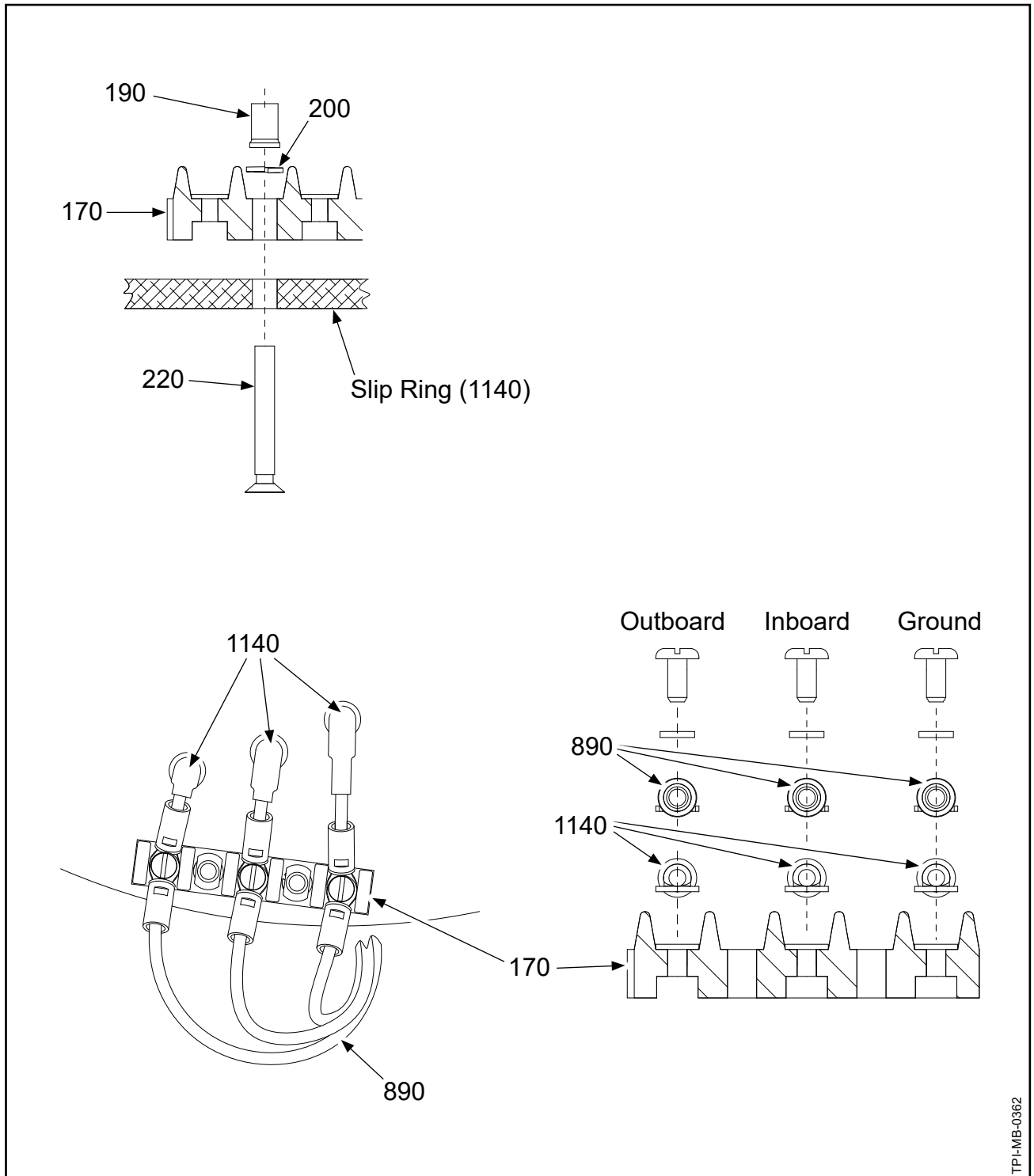
- (11) Attach the wire harness (890) to the counterweight web with one tie strap (930) as shown in Figure EB-5.
  - (a) Install the tie strap (930) over the clear tubing of the wire harness (890) on both sides of the counterweight.
- (12) Put the wire harness (890) on the wire harness bracket (1300) with the O-ring off of the edge of the bracket as shown in Figure EB-6.

**CAUTION:** TWISTING OF THE LEAD WIRES IS NOT PERMITTED.

- (a) Attach the wire harness (890) to the wire harness bracket (1300) with two tie straps (910) as shown in Figure EB-6.
- (13) Attach the lead wires from the slip ring (1140) and the lead wires from the wire harness (890) to the terminal strip (170) in accordance with Figure EB-1.
  - (a) Tighten the terminal strip screws until snug.
- (14) Cycle the propeller blades from low angle to feather angle to verify proper wire harness installation. Make sure the wire harness is not blocked during cycling.

# **HARTZELL ICE PROTECTION SYSTEM MANUAL 180**

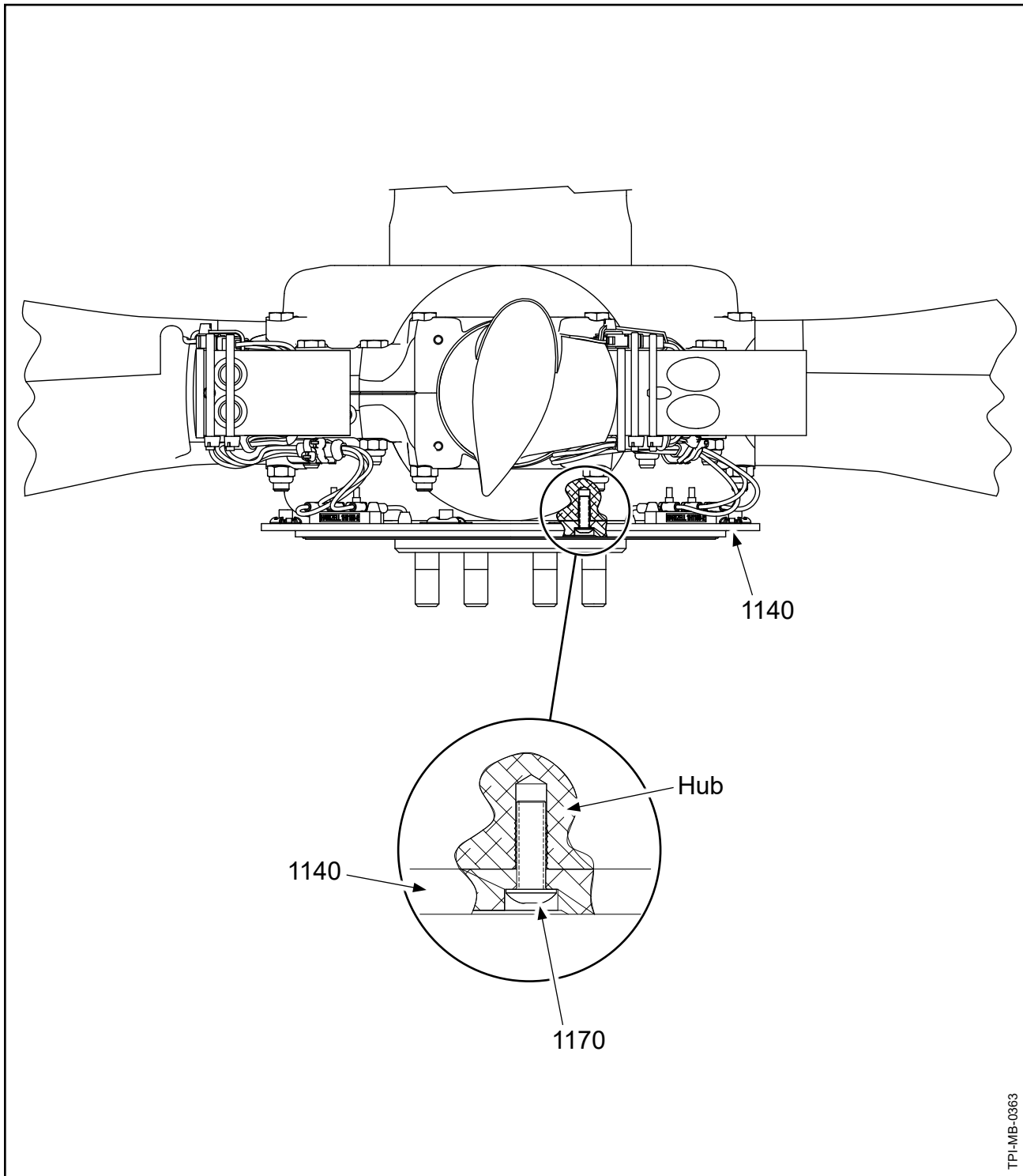
This section includes the installation instructions and parts list(s)  
for the following electric de-ice kit(s):  
**107608**



**Terminal Strip Hardware Configuration: Slip Ring Mounted**  
**Figure EB-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

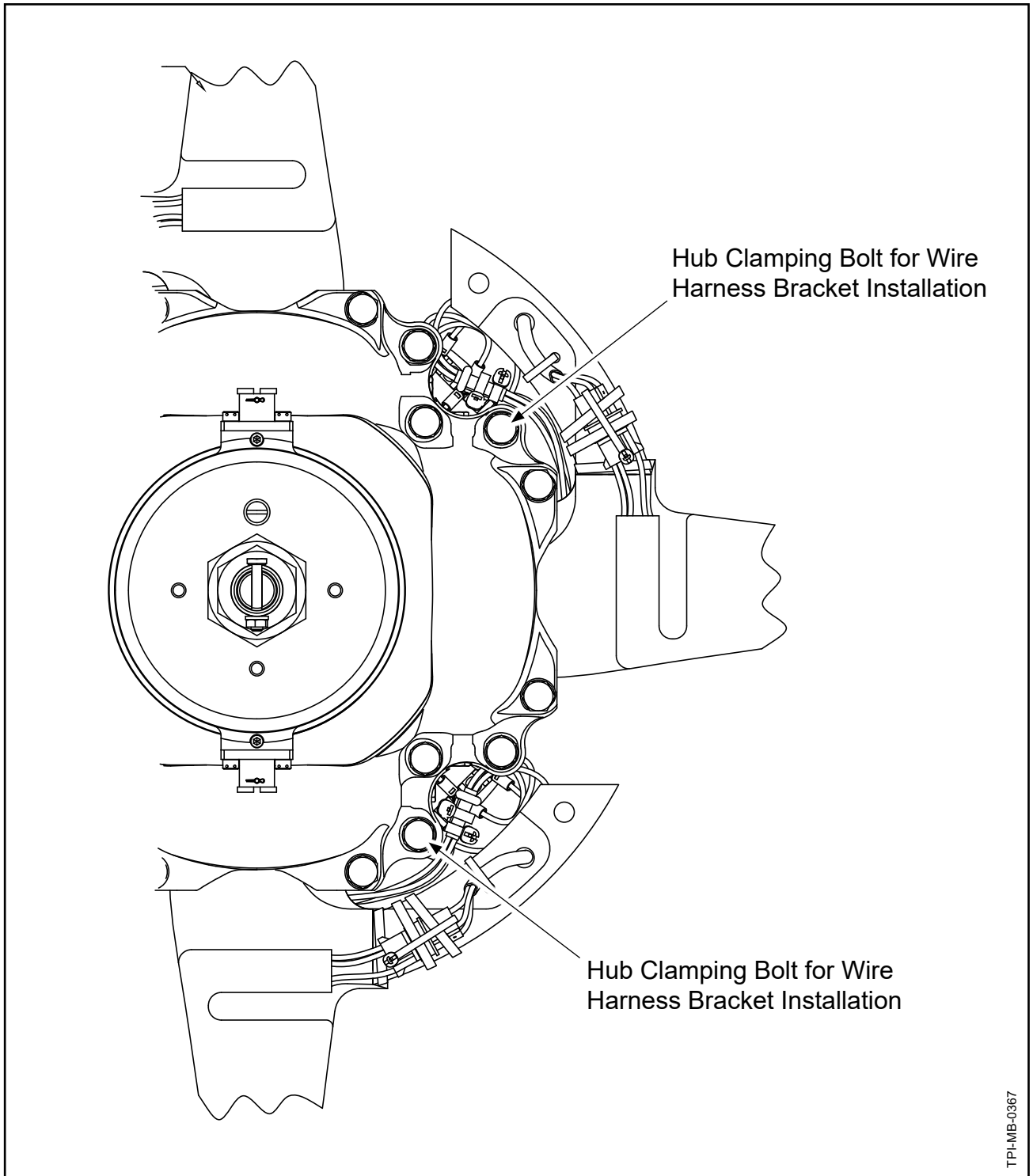
This section includes the installation instructions and parts list(s)  
for the following electric de-ice kit(s):  
**107608**



**Slip Ring Mounting  
Figure EB-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

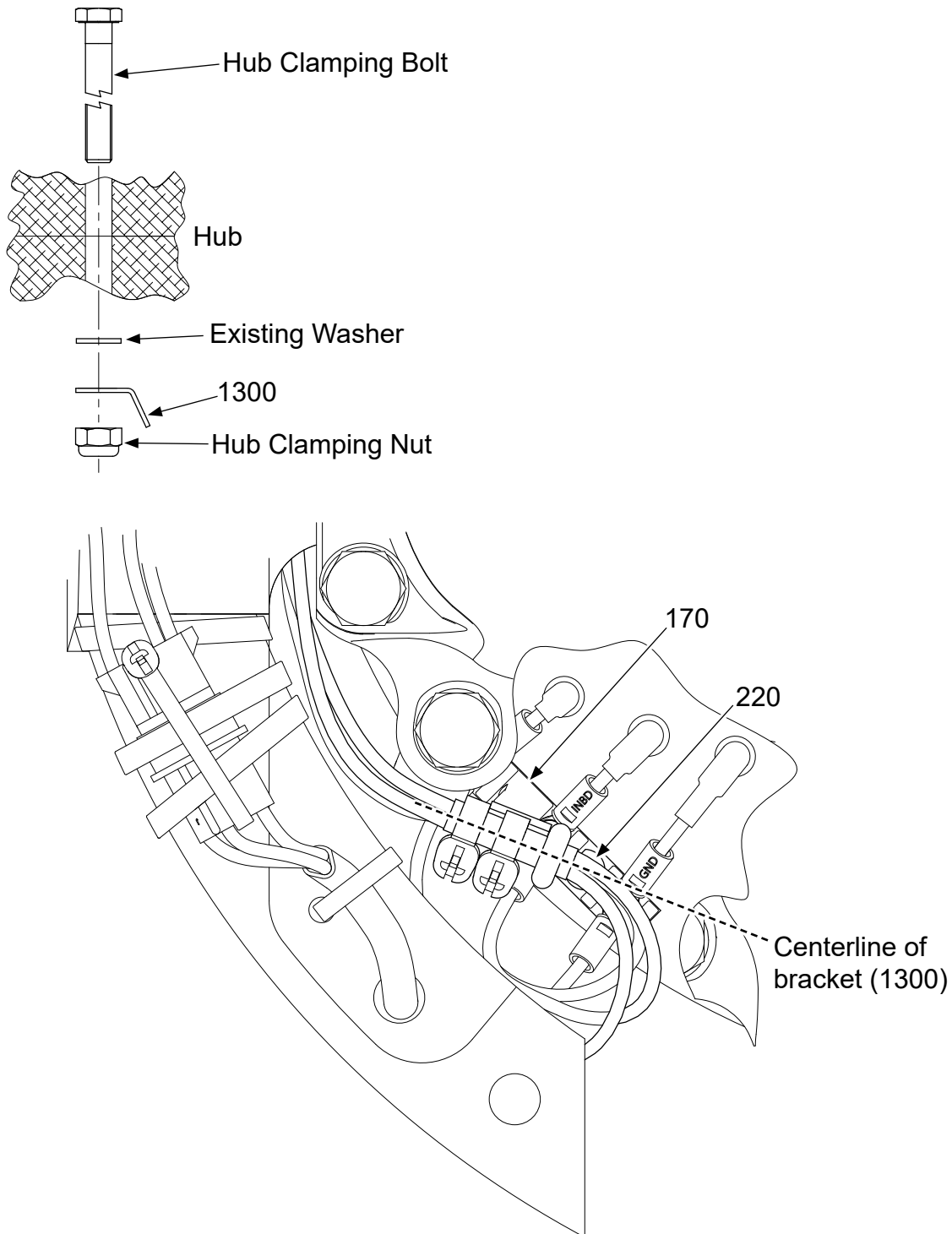
This section includes the installation instructions and parts list(s)  
for the following electric de-ice kit(s):  
**107608**



**Hub Clamping Bolt for Wire Harness Bracket Installation  
Figure EB-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the installation instructions and parts list(s)  
for the following electric de-ice kit(s):  
**107608**



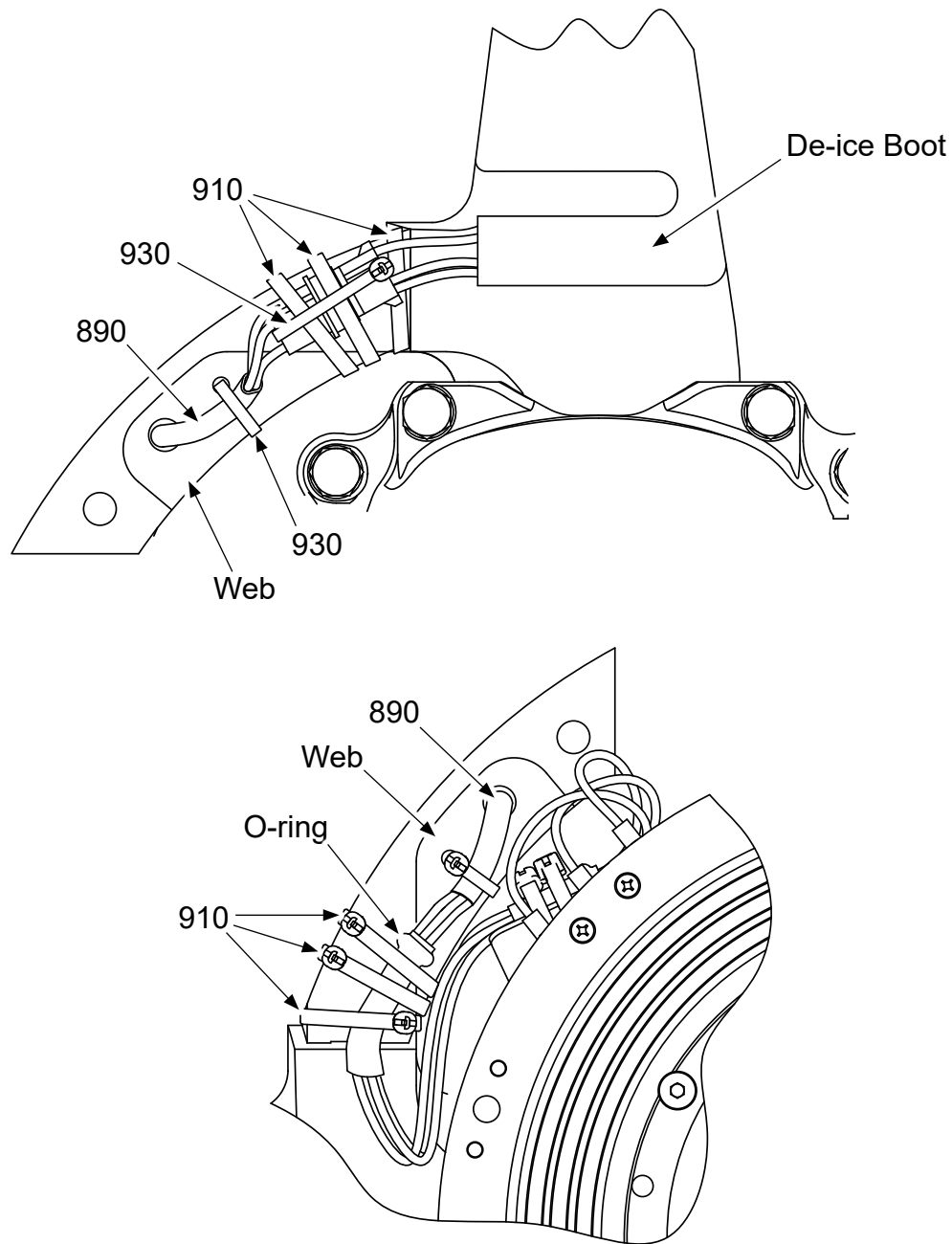
**Wire Harness Bracket Installation  
Figure EB-4**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the installation instructions and parts list(s)  
for the following electric de-ice kit(s):

**107608**

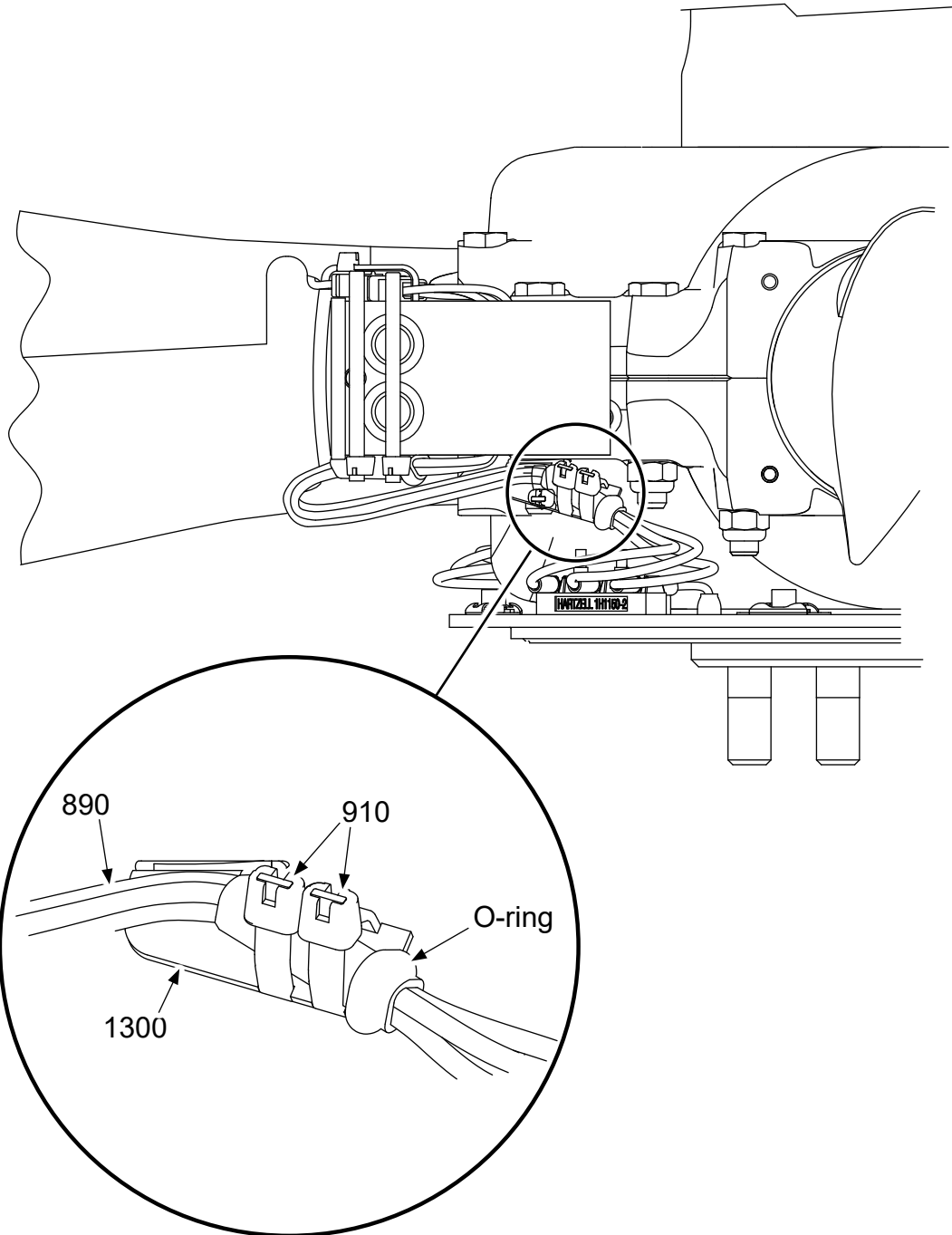


TPI-MB-0365

**Attaching the Wire Harness to the Counterweight  
Figure EB-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the installation instructions and parts list(s)  
for the following electric de-ice kit(s):  
**107608**



TPI-MB-0366

**Attaching the Wire Harness to the Bracket  
Figure EB-6**

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the installation instructions and parts list(s)  
for the following electric de-ice kit(s):

**107608**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>107608</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11EB</b> <b>FIGURES: EB-1 thru EB-6</b>		
170	1H1150-2	• TERMINAL STRIP	4	
190	2H1365	• TAPPED EYELET	8	Y
200	B-3854-41	• WASHER, LOCK	8	Y
220	B-3871-S32	• SCREW, 6-32, 100 DEG HEAD	8	Y
890	107607	• WIRE HARNESS	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	20	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	8	Y
1140	107530	• SLIP RING ASSEMBLY	1	
1170	A-2070-6	• SCREW, 1/4-28, BUTTON HEAD	8	Y
1300	105558L	• BRACKET, WIRE HARNESS, LH	4	

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 107608**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the installation instructions and parts list(s)  
for the following electric de-ice kit(s):

**107608**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**107716**

**EC. Installation Instruction 11EC**

- (1) Using the screw (220), washers (200 and 210), and tapped eyelet (190), attach the terminal strip (170) to the bulkhead in accordance with Figure EC-1.
  - (a) Torque the screw (220) to 10-12 In-Lbs (1.2-1.3 N•m).
- (2) Using the screws (1170), attach the slip ring (1140) and the bulkhead to the hub in accordance with Figure EC-2.
  - (a) Torque each screw (1170) to 8-10 Ft-Lbs (10.9-13.5 N•m).
- (3) Perform a slip ring run-out check in accordance with the Check chapter of this manual.
- (4) Set the propeller blades at reverse blade angle.
- (5) Press the spring pin (905) perpendicularly into the hole in the counterweight as shown in Figure EC-3.
  - (a) The spring pin (905) must extend to a height of 0.170 - 0.210 inch (4.32-5.33 mm).

**NOTE:** The counterweight could have been drilled for the spring pin (905) or it could have an integral (cast) pin instead of a spring pin.

- (6) Assemble the plug connection between the wire harness (890) and the de-ice boot.
- (7) Put the wire harness/de-ice boot plug connection in the counterweight groove and against the spring pin (905) or integral cast pin as shown in Figure EC-4.
- (8) Install the tie strap (910) in the retaining grooves of the counterweight and around the counterweight and between the wires of the wire harness/de-ice boot plug connection.

**CAUTION:** ROUTING THE TIE STRAP (910) INCORRECTLY CAN CAUSE AN ELECTRICAL SHORT IN THE DE-ICE SYSTEM.

- (a) On the de-ice boot-side of the plug connection, install the tie strap (910) between wire 2 and wire 3 as shown in Figure EC-4.
  - (b) On the wire harness-side of the plug connection, install the tie strap (910) between wire 1 and wire 2 as shown in Figure EC-4.
  - (c) Put the head of the tie strap (910) in the approximate location shown in Figure EC-4.
- (9) Using the tie strap (930), attach the de-ice boot lead wires to the tie strap (910) as shown in Figure EC-4.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**107716**

**EC. Installation Instruction 11EC - continued**

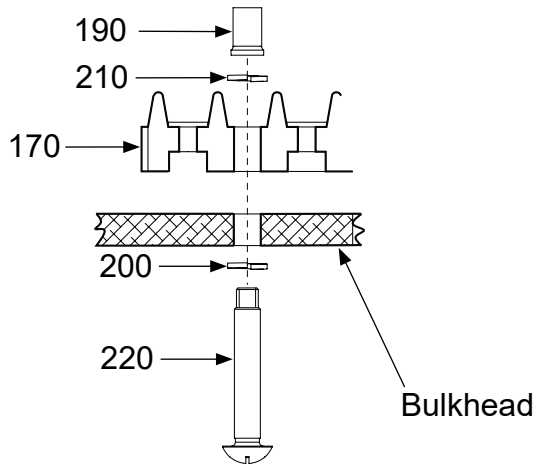
- (10) Install the clamp (660) around the wire harness (890) and put it against the O-ring as shown in Figure EC-5.
- (11) Install the clamp (660) onto the counterweight.
  - (a) Put the centerline of the clamp (660) parallel to the hub surface as shown in Figure EC-5.
  - (b) Apply threadlocker CM399 to the threads of the screw (650).
  - (c) Using the screw (650) and washers (630), install the clamp (660) to the counterweight in accordance with Figure EC-6.
  - 1 Torque the screw (650) to 20-22 In-Lbs (2.3-2.4 N•m).
- (12) Install the washers (1305), wire harness bracket (1300), existing hub clamping washer, and existing hub clamping nut onto the the hub clamping bolt (1315) in accordance with Figure EC-7.
  - (a) Put the long edge of wire harness bracket (1300) parallel to the blade centerline as shown in Figure EC-8.
  - (b) Torque the hub clamping nut to 20-24 Ft-Lbs (28-32 N•m).
- (13) Attach the wire harness (890) to the wire harness bracket (1300) as shown in Figure EC-8.
  - (a) Position the wire harness (890) with the O-ring off of the edge of the bracket (1300) as shown in Figure EC-8.

**CAUTION: DO NOT TWIST THE LEAD WIRES.**

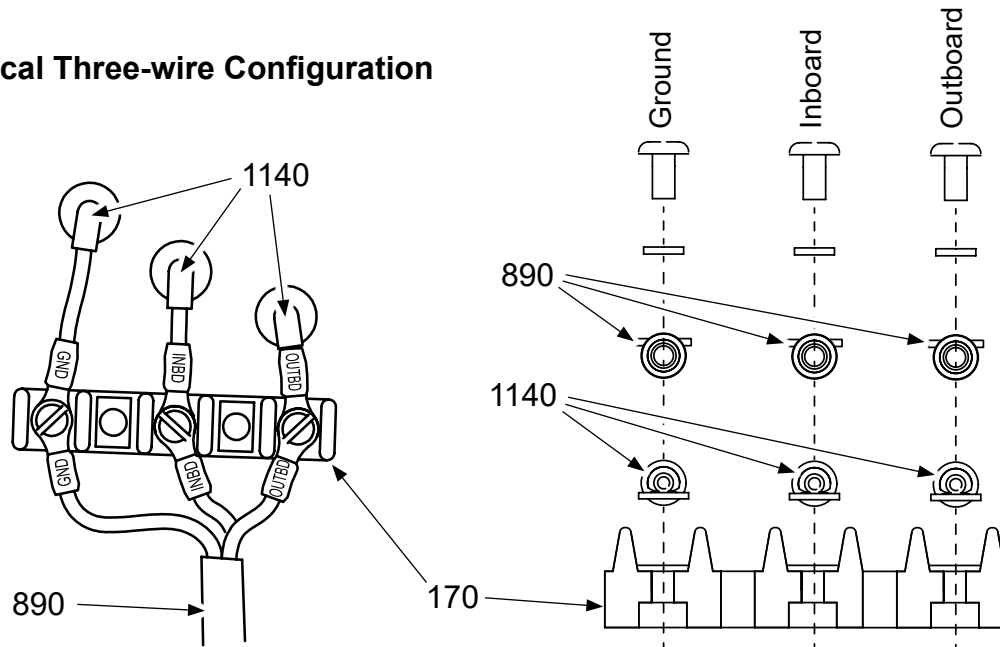
- (b) Attach the wire harness (890) to the bracket (1300) with two tie straps (840). Twisting of the lead wires is not permitted.
  - (c) Position the heads of the tie straps (840) as shown in Figure EC-8.
- (14) Attach the slip ring lead wires and de-ice wire harness (890) to the terminal strip (170) in accordance with Figure EC-1.
  - (a) Tighten the terminal screws until snug.
- (15) Cycle the propeller blades from reverse angle to feather angle to make sure of proper wire harness installation.
  - (a) Make sure the wire harness is not blocked during cycling.

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions for the following electric de-ice kit(s):  
**107716**



## Typical Three-wire Configuration

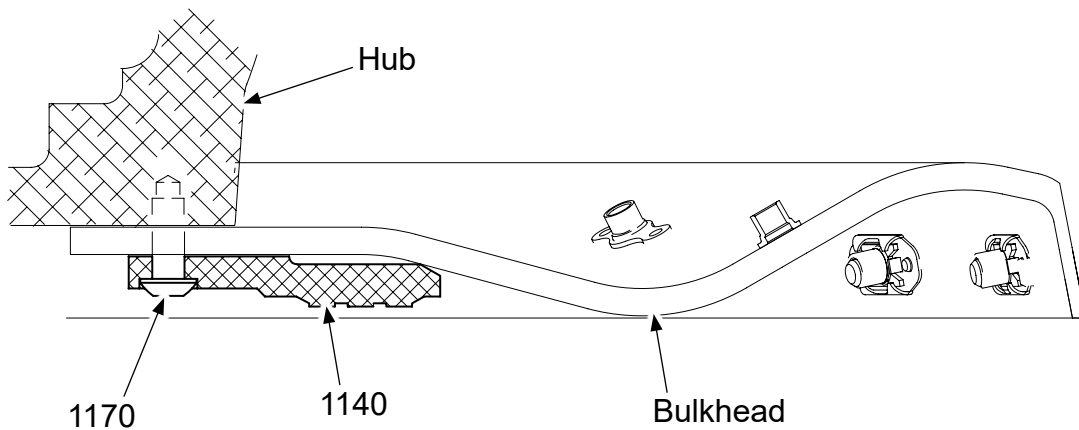


**NOTE:** The illustrations show slip ring wires on a typical right-hand (rotation) propeller.

**Terminal Strip: Bulkhead Mounted**  
**Figure EC-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**107716**



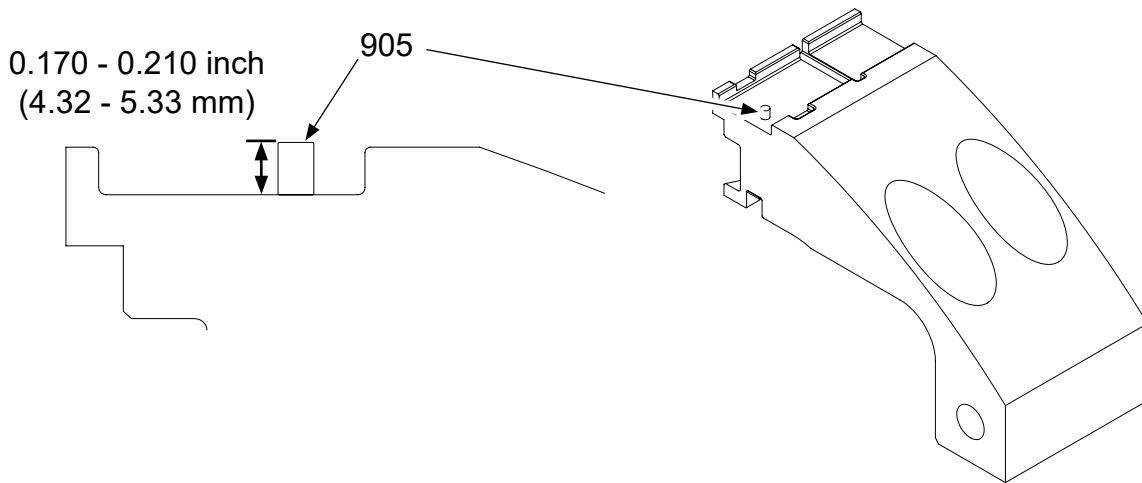
TPI-MB-0223

**Slip Ring Mounting  
Figure EC-2**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**107716**

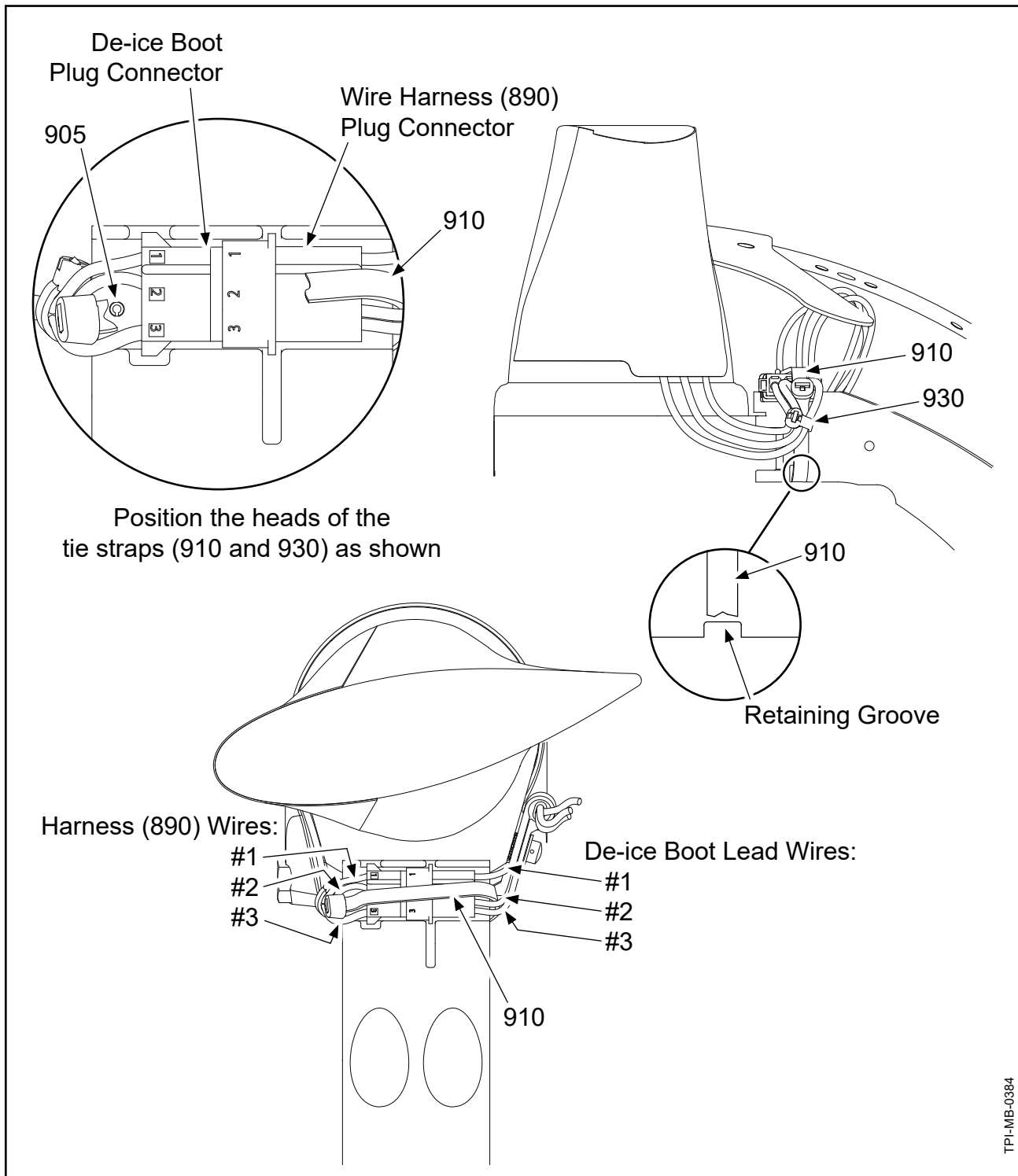


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**Spring Pin Height  
Figure EC-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

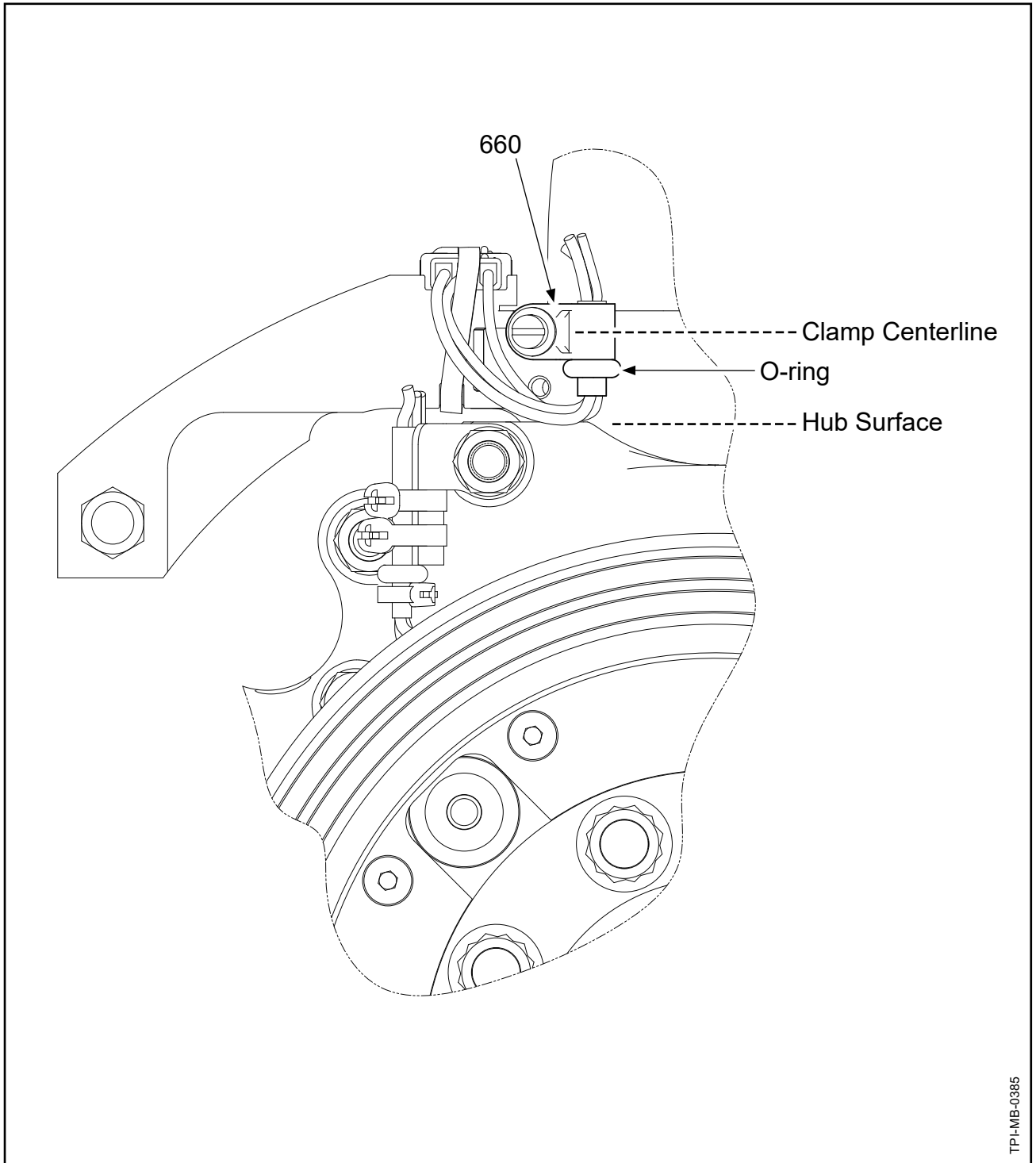
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**107716**



**Wire Harness-to-Blade Shank/Counterweight  
Figure EC-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

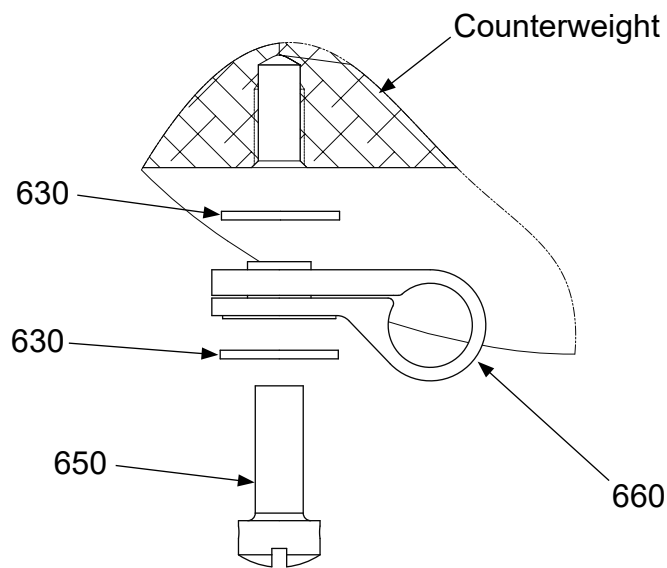
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**107716**



**Loop Clamp Orientation  
Figure EC-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**107716**

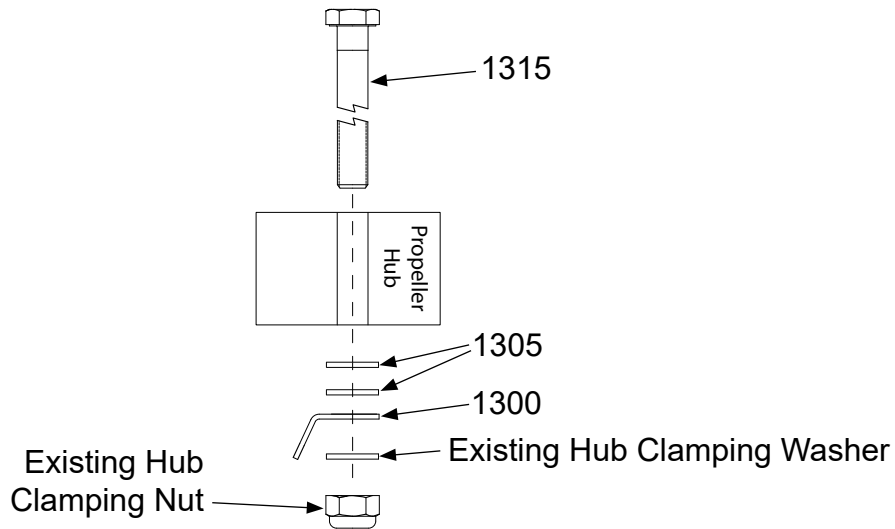


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**Loop Clamp to Counterweight Hardware Configuration  
Figure EC-6**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

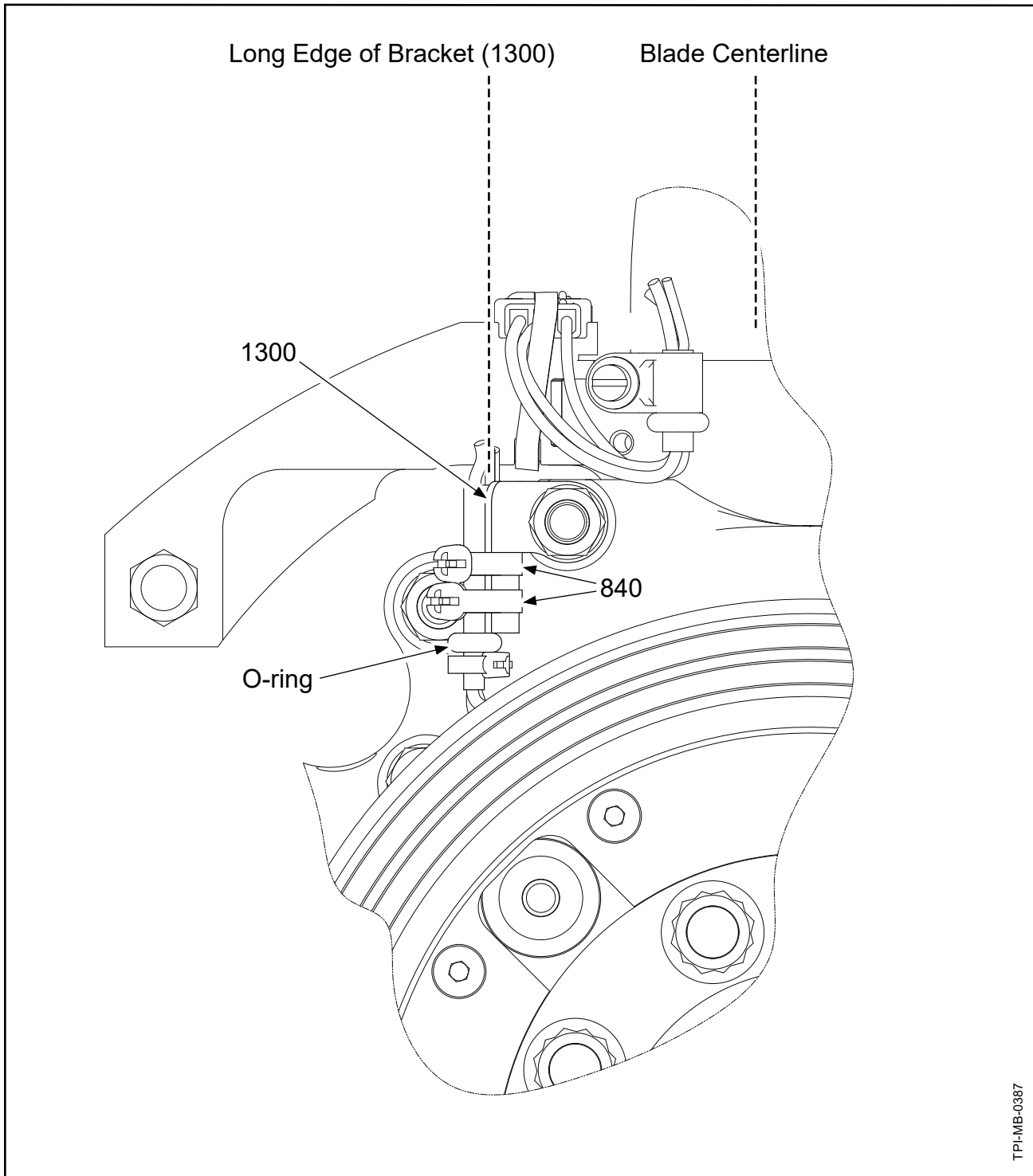
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**107716**



**Wire Harness Bracket Hardware Configuration  
Figure EC-7**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**107716**



**Wire Harness Bracket Alignment  
Figure EC-8**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**107716**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>107716</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11EC</b> <b>FIGURES: EC-1 thru EC-8</b>		
170	1H1150-2	• TERMINAL STRIP	4	
190	2H1365	• TAPPED EYELET	8	Y
200	B-3854-41	• WASHER, LOCK	8	Y
210	B-3854-41	• WASHER, LOCK	8	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	8	Y
630	B-3837-0332	• WASHER, CORROSION RESISTANT	8	Y
645	B-3855-32	• DELETED	-	
650	B-3840-7	• SCREW, 10-32, FILLISTER HEAD	4	Y
660	B-3853-F5	• CLAMP, LOOP, NYLON	4	Y
840	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	8	Y
890	107715	• WIRE HARNESS	4	Y
905	B-3842-0437	• SPRING PIN, 3/32", CRES	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	4	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	4	Y
1140	107714	• SLIP RING ASSEMBLY	1	
1170	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	8	Y
1300	B-6265	• BRACKET, WIRE HARNESS	4	
1305	B-3834-0663	• WASHER	8	Y
1315	102691	• BOLT, 3/8-24, HEX HEAD	4	

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 107716**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**107716**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**108004**

**ED. Installation Instruction 11ED**

- (1) Using screws (1205), attach the slip ring (1140) and the bulkhead to the hub in accordance with Figure ED-1.
  - (a) Torque each screw (1205) 8 - 10 Ft-Lbs (10.8-13.5 N•m).
  - (b) Perform a slip ring run-out check in accordance with the Check chapter in this manual.
- (2) Using the screw (220), washers (200 and 210), and tapped eyelet (190), attach the terminal strip (170) to the bulkhead in accordance with Figure ED-2.
  - (a) Torque the screws (220) to 10-12 In-Lb (1.12-1.35 N•m).
- (3) Remove the existing hub clamping bolt and install a hex bolt (1315) through the hub on the counterweight-side of all four blades as shown in Figure ED-3.
- (4) Install the wire harness bracket (1300).
  - (a) Install one washer (1305), one washer (1310), one wire harness bracket (1300), the existing hub washer, and the existing hub clamping nut onto the hex bolt (1315) in accordance with Figure ED-4.
  - (b) Position the wire harness bracket (1300) so that the long edge of the bracket is parallel with the blade centerline as shown in Figure EE-3.
  - (c) Torque the hub clamping nut (dry) to 20 - 24 Ft-Lbs (27 - 33 N•m).
- (5) Move the propeller blades to low blade angle.
- (6) Assemble the plug connection between the wire harness (890) and the de-ice boot.
  - (a) Install one tie strap (930) around the wire harness/de-ice boot plug connection in accordance with Figure ED-5, but do not tighten the tie strap at this time.
- (7) Route the terminal ends of the wire harness (890) through the hole in the counterweight web as shown in Figure ED-5.
- (8) Secure the wire harness/boot plug connection to the counterweight.
  - (a) Position the O-ring on the wire harness (890) at the edge of the counterweight web as shown in Figure ED-5.
  - (b) Install two tie straps (910) under the tie strap (930) connecting the wire harness/boot plugs, and around the counterweight and over the wire harness shrink tubing as shown in Figure ED-5.
  - (c) Position the tie strap heads in the approximate location shown in Figure ED-5, then tighten the tie straps (910 and 930).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**108004**

**ED.    Installation Instruction 11ED - continued**

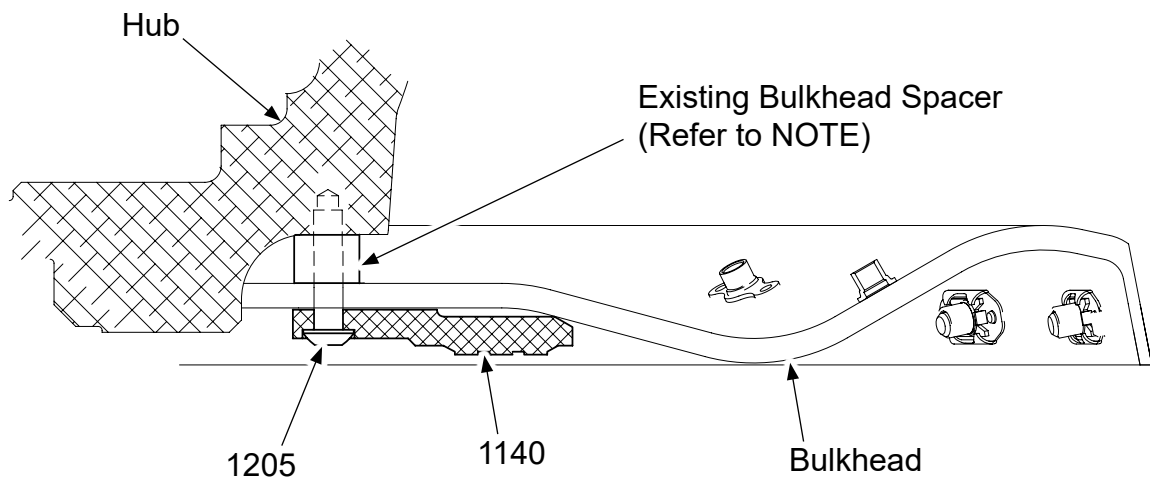
- (d) Install one tie strap (930) through the small hole in the counterweight, under the counterweight, and around the clear tubing on the wire harness (890) as shown in Figure ED-5.
  - 1    Make sure the tie strap (930) is over the clear tubing of the wire harness (890) on both sides of the counterweight.
- (9) Install one tie strap (940) around the wire harness (890) below the O-ring at the terminal-end of the harness as shown in Figure ED-6.
- (10) Secure the wire harness (890) to the wire harness bracket (1300).
  - (a) Position the wire harness (890) so that the O-ring is on top of the wire harness bracket (1300) as shown in Figure ED-7.

**CAUTION:    DO NOT TWIST THE LEAD WIRES.**

- (b) Install and tighten two tie straps (940) around the wire harness bracket (1300) and the shrink tubing on the wire harness (890) as shown in Figure ED-7.
  - 1    Position the tie straps (940) in the grooves on the wire harness bracket (1300) as shown in Figure ED-7.
  - 2    Position the heads of the tie straps as shown in Figure ED-7.
- (11) Attach the lead wires from the wire harness (890) and the slip ring lead wires to the terminal strip (170) in accordance with Figure ED-2.
  - (a) Tighten the screws on the terminal strip (170) until snug.
- (12) Cycle the propeller from low angle to feather angle to verify correct wire harness installation.
  - (a) Make sure the wire harness is not blocked during cycling.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**108004**



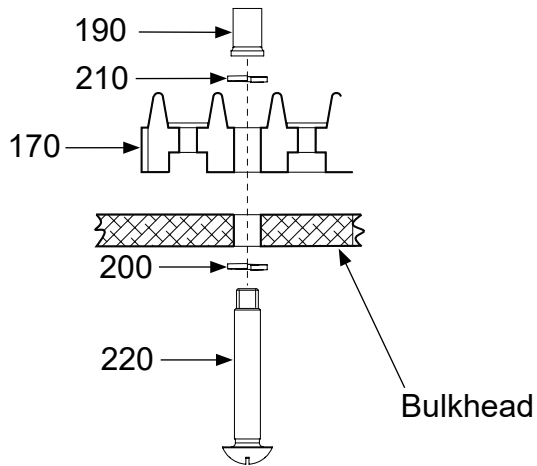
**NOTE:** The bulkhead spacer is a spinner mounting component and is application specific. Refer to Hartzell Propeller Application Guide Manual 159 (61-02-59).

TPI-MB-0204

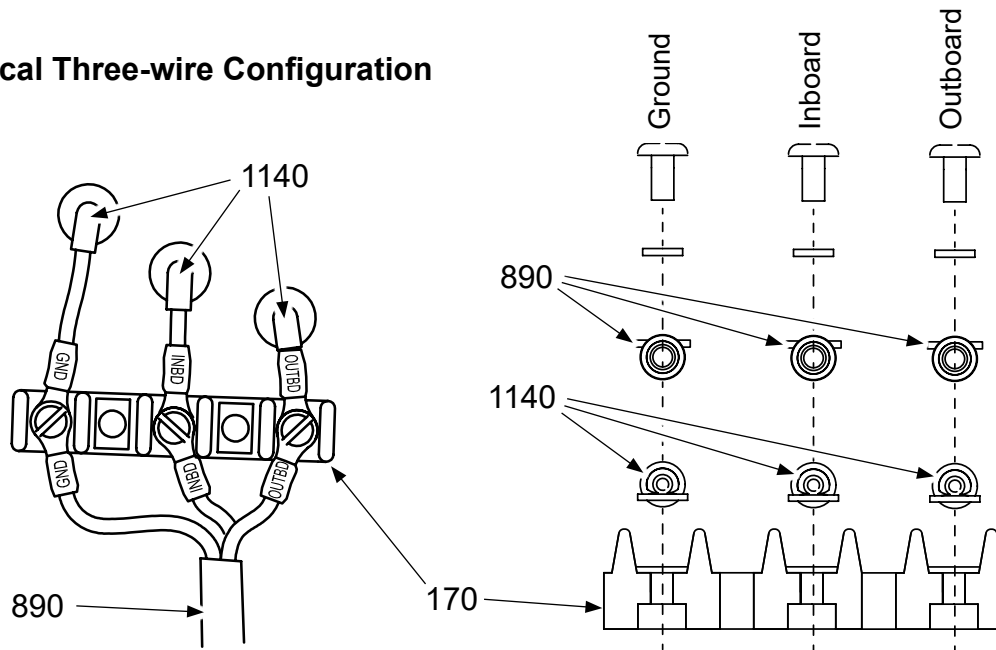
**Slip Ring Mounting  
Figure ED-1**

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**108004**



## Typical Three-wire Configuration

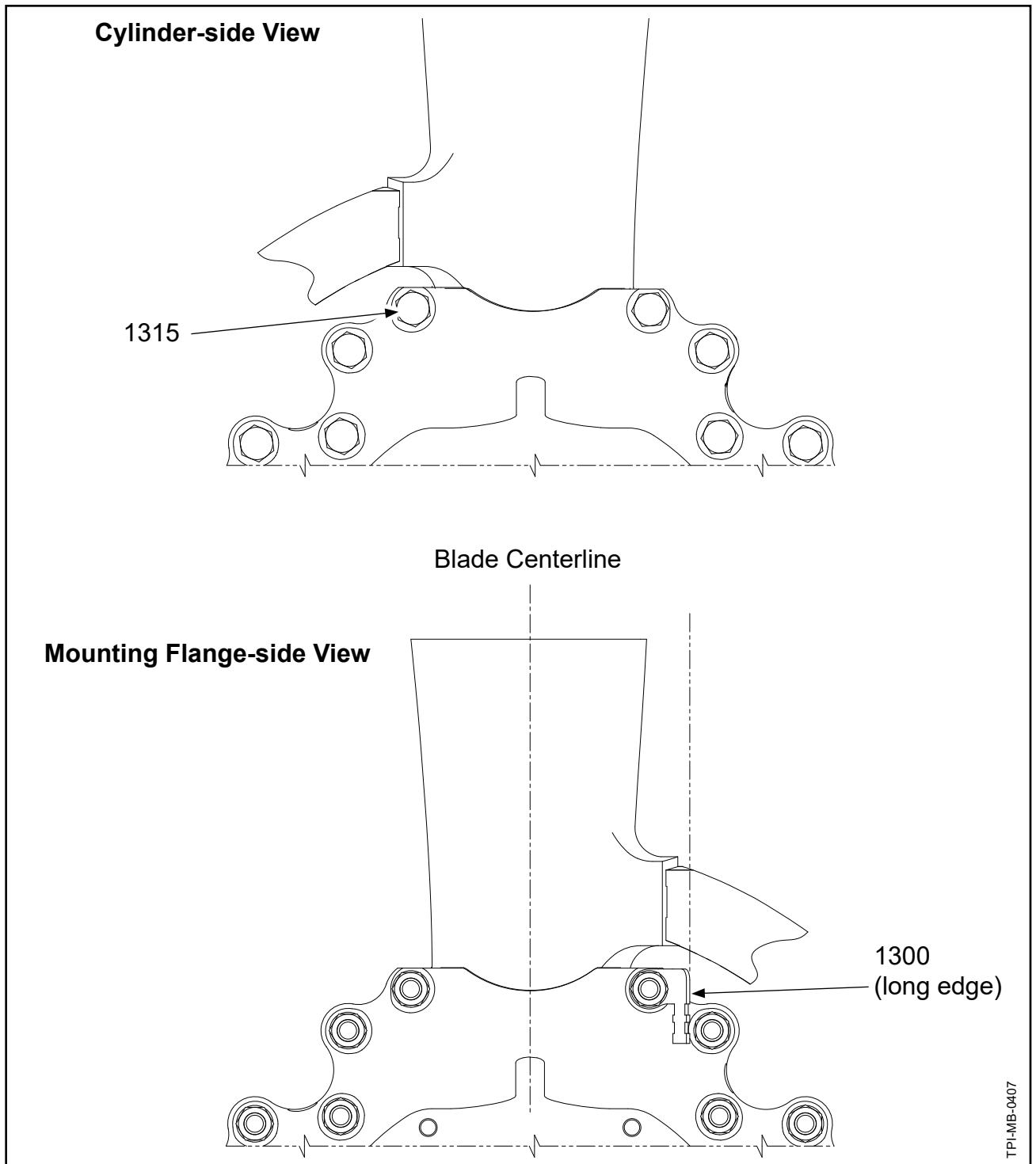


**NOTE:** The illustrations show slip ring wires on a typical right-hand (rotation) propeller.

**Terminal Strip: Bulkhead Mounted**  
**Figure ED-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

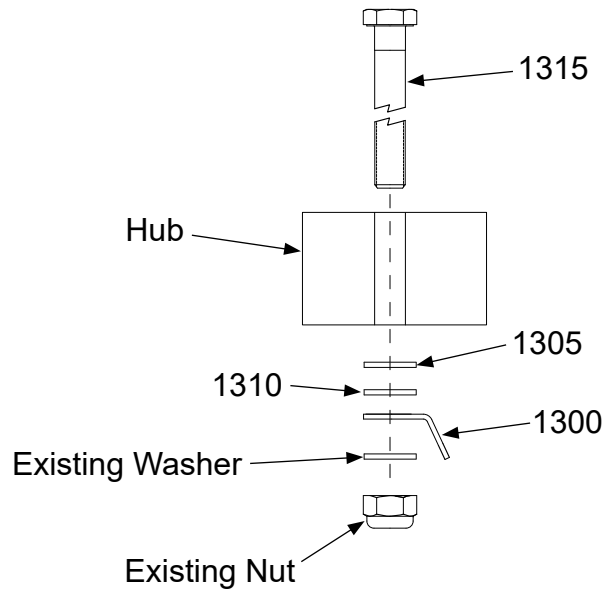
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**108004**



**Wire Harness Bracket Alignment  
Figure ED-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**108004**

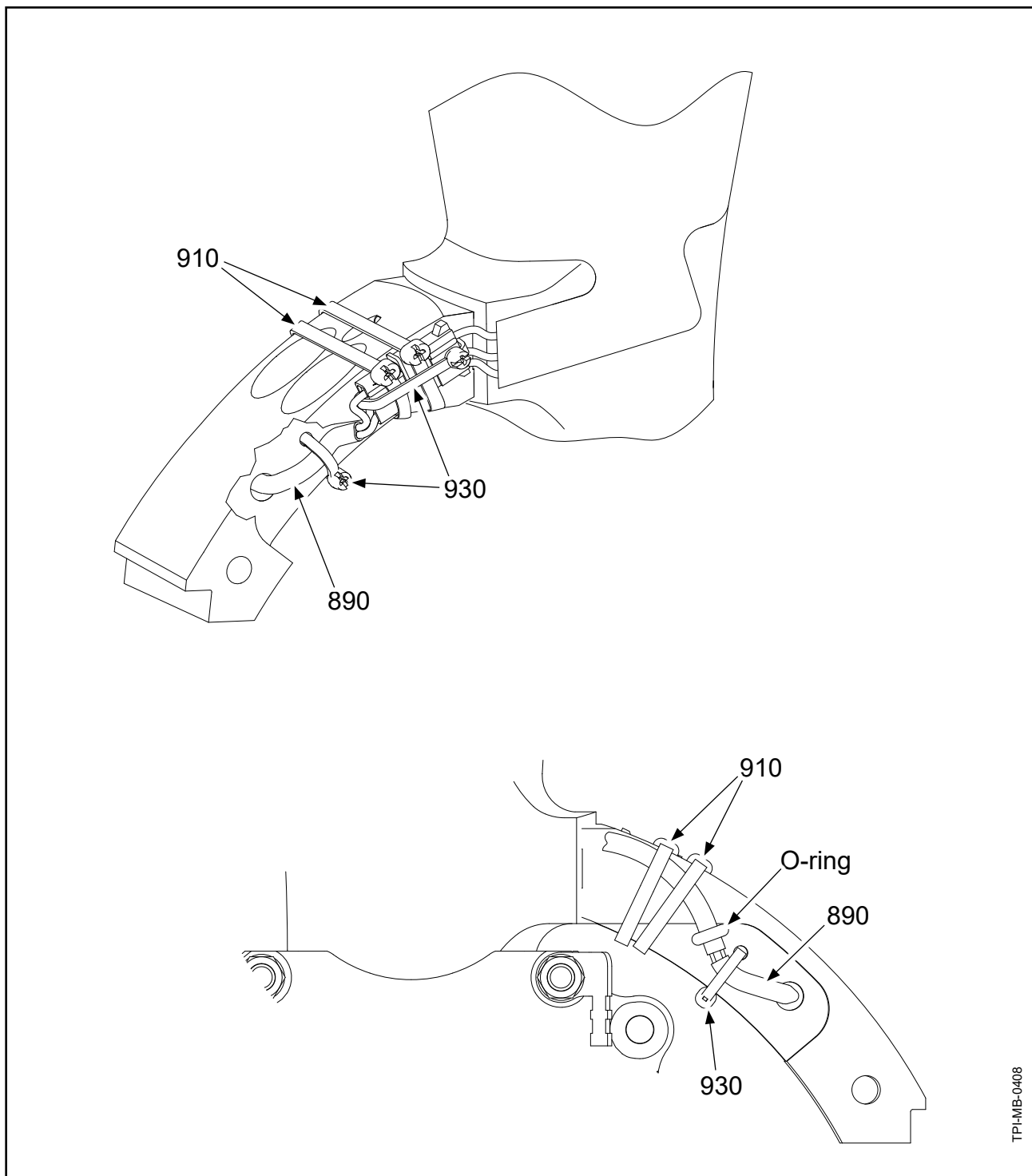


**Wire Harness Bracket Hardware Configuration  
Figure ED-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

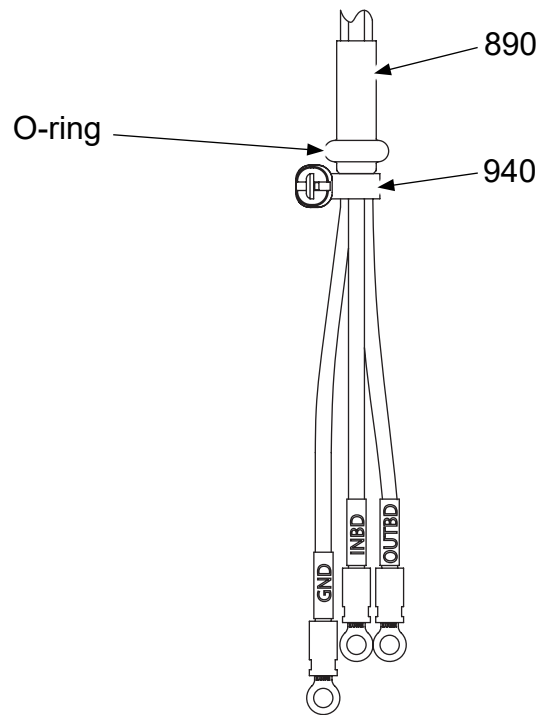
**108004**



**Wire Harness to Counterweight  
Figure ED-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**108004**



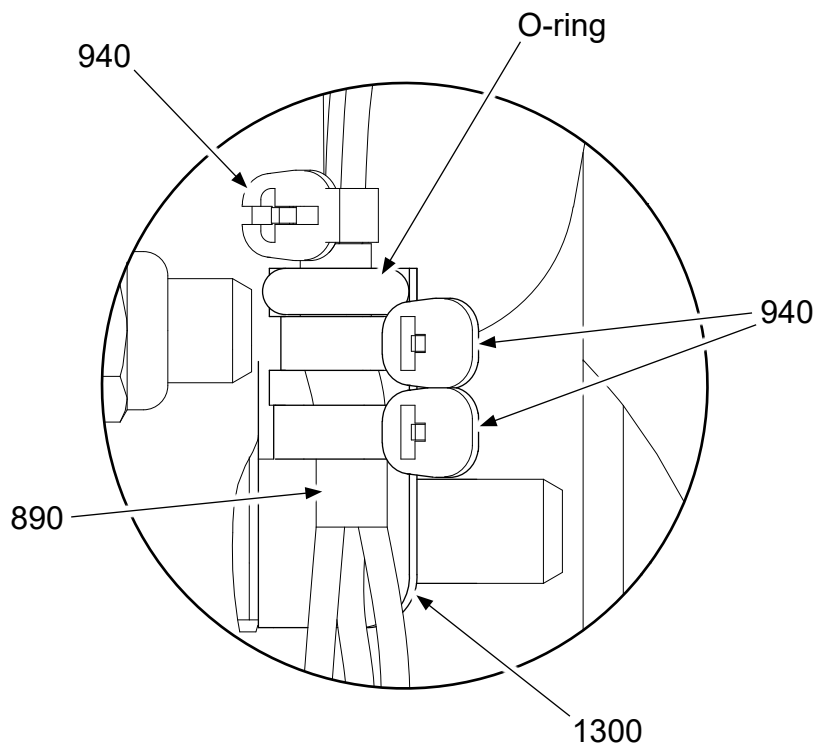
TPHMB-0130

**Wire Harness Tie Strap Location  
Figure ED-6**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**108004**



**Wire Harness to De-ice Bracket  
Figure ED-7**

TP1-MB-0409

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**108004**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>108004</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11ED FIGURES: ED-1 thru ED-7</b>		
170	1H1150-2	• TERMINAL STRIP	4	
190	2H1365	• TAPPED EYELET	8	Y
200	B-3854-41	• WASHER, LOCK	8	Y
210	B-3854-41	• WASHER, LOCK	8	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	8	Y
890	108003	• WIRE HARNESS	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	16	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	8	Y
940	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	4	Y
1140	106556	• SLIP RING ASSEMBLY	1	
1205	A-2070-11	• SCREW, 1/4-28, BUTTON HEAD	8	Y
1300	B-6265L	• BRACKET, WIRE HARNESS, LH	4	
1305	B-3834-0663	• WASHER	4	Y
1310	B-3834-0632	• WASHER	4	Y
1315	102691	• BOLT, 3/8-24, HEX HEAD	4	

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 108004**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**107982(X)**

**EE. Installation Instruction 11EE**

- (1) Using screws (1205), attach the slip ring (1140) and the bulkhead to the hub in accordance with Figure EE-1.
  - (a) Torque each screw (1205) 8 - 10 Ft-Lbs (10.8-13.5 N•m).
  - (b) Perform a slip ring run-out check in accordance with the Check chapter in this manual.
- (2) Move the propeller blades to reverse blade angle.
- (3) Using screws (320) and washers (200), attach the terminal strip (170) and the terminal strip spacer (340) to the counterweight in accordance with Figure EE-2.
  - (a) Torque the screws (320) to 10-12 In-Lb (1.12-1.35 N•m).
- (4) Route the terminal ends of the de-ice boot lead wires under the counterweight as shown in Figure EE-2.
  - (a) Attach the de-ice boot lead wires and the lead wires from the wire harness (890) to the terminal strip (170) in accordance with Figure EE-2.
    - 1 Tighten the screws on the terminal strip (170) until snug.
- (5) Press the spring pin (905) perpendicularly into the hole in the counterweight as shown in Figure EE-3.
  - (a) The spring pin (905) must extend to a height of 0.23-0.27 inch (5.8-6.8 mm).
- (6) Install the clamp (660) around the wire harness (890) then position the clamp against the spring pin (905) as shown in Figure EE-3.
  - (a) Apply threadlocker CM399 to the threads of the screw (650).
  - (b) Using the screw (650), lockwasher (640), and washers (630), attach the clamp (660) to the counterweight in accordance with Figure EE-3.
    - 1 Torque the screw (650) to 22-25 In-Lbs (30-33 N•m).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**107982(X)**

**EE.**    Installation Instruction 11EE, continued

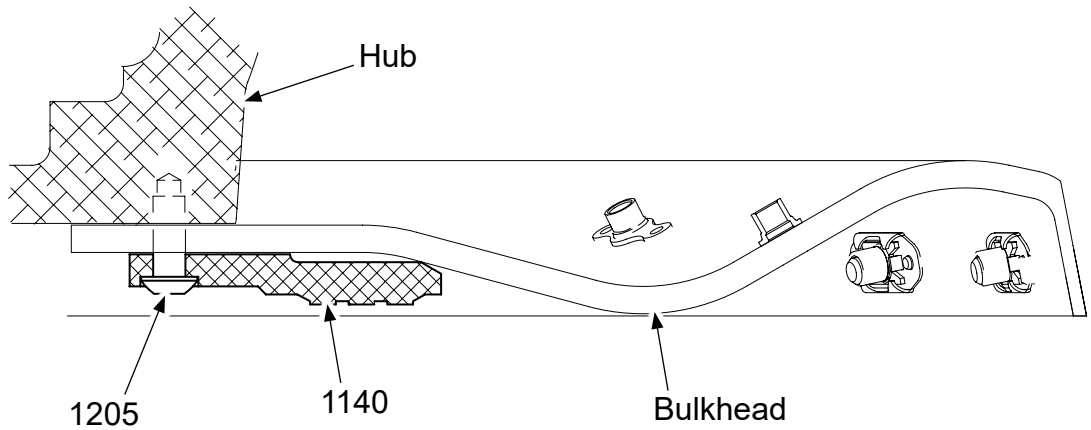
- (7) Using screws (220), washers (200), and tapped eyelet (190), attach the terminal strip (170) and the terminal strip spacer (340) to the bulkhead in accordance with Figure EE-4.
  - (a) Torque the screws (220) to 10-12 In-Lb (1.12-1.35 N•m).
- (8) Remove the existing hub clamping nut and existing hub washer on the counterweight-side of the blade.
- (9) Install the wire harness bracket (1300).
  - (a) Install the existing hub washer, the wire harness bracket (1300), and the existing hub clamping nut onto the hub clamping bolt in accordance with Figure EE-5.
  - (b) Position the wire harness bracket (1300) so that the long edge of the bracket is perpendicular to the bulkhead terminal strip (170) as shown in Figure EE-5.
  - (c) Torque the hub clamping nut to 20-22 Ft-Lbs (28-29 N•m).
- (10) Secure the wire harness (890) to the wire harness bracket (1300).
  - (a) Position the wire harness (890) so that the O-ring is on top of the wire harness bracket (1300) and against the tie strap (940) as shown in Figure EE-5.

**CAUTION:**    DO NOT TWIST THE LEAD WIRES.

- (b) Install and tighten two tie straps (940) around the wire harness bracket (1300) and the shrink tubing on the wire harness (890) as shown in Figure EE-5.
  - 1    Position the tie straps (940) in the grooves on the wire harness bracket (1300) as shown in Figure EE-5.
  - 2    Position the heads of the tie straps (940) as shown in Figure EE-5.
- (11) Attach the lead wires from the wire harness (890) and the slip ring lead wires to the bulkhead terminal strip (170) in accordance with Figure EE-4.
  - (a) Tighten the screws on the terminal strip (170) until snug.
  - (b) Install one tie strap (940) around the leads of the wire harness (890) as shown in Figure EE-5.
- (12) Cycle the propeller from reverse angle to feather angle to verify correct wire harness installation.
  - (a) Make sure the wire harness is not blocked during cycling.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**107982(X)**

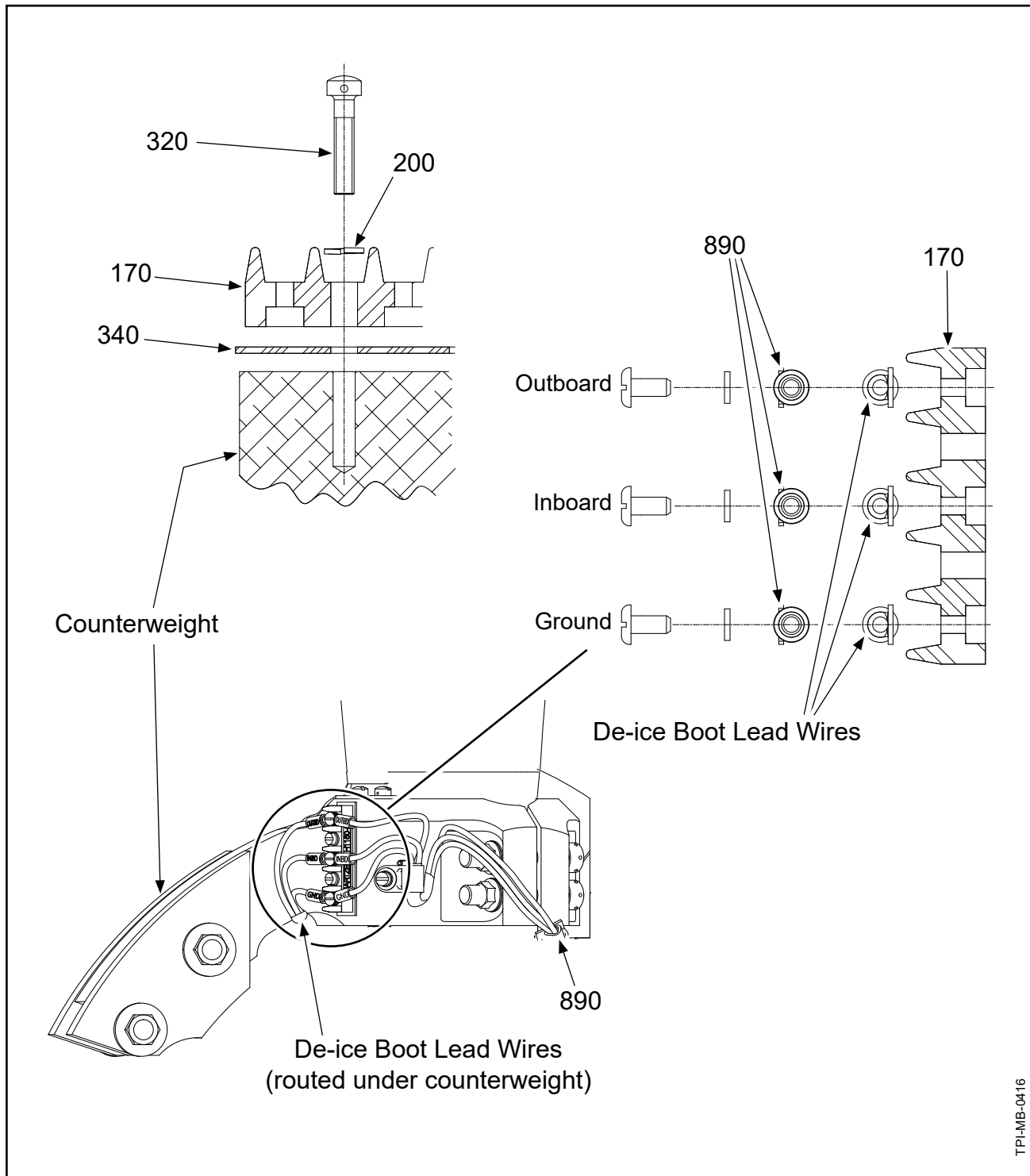


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**Slip Ring Mounting  
Figure EE-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

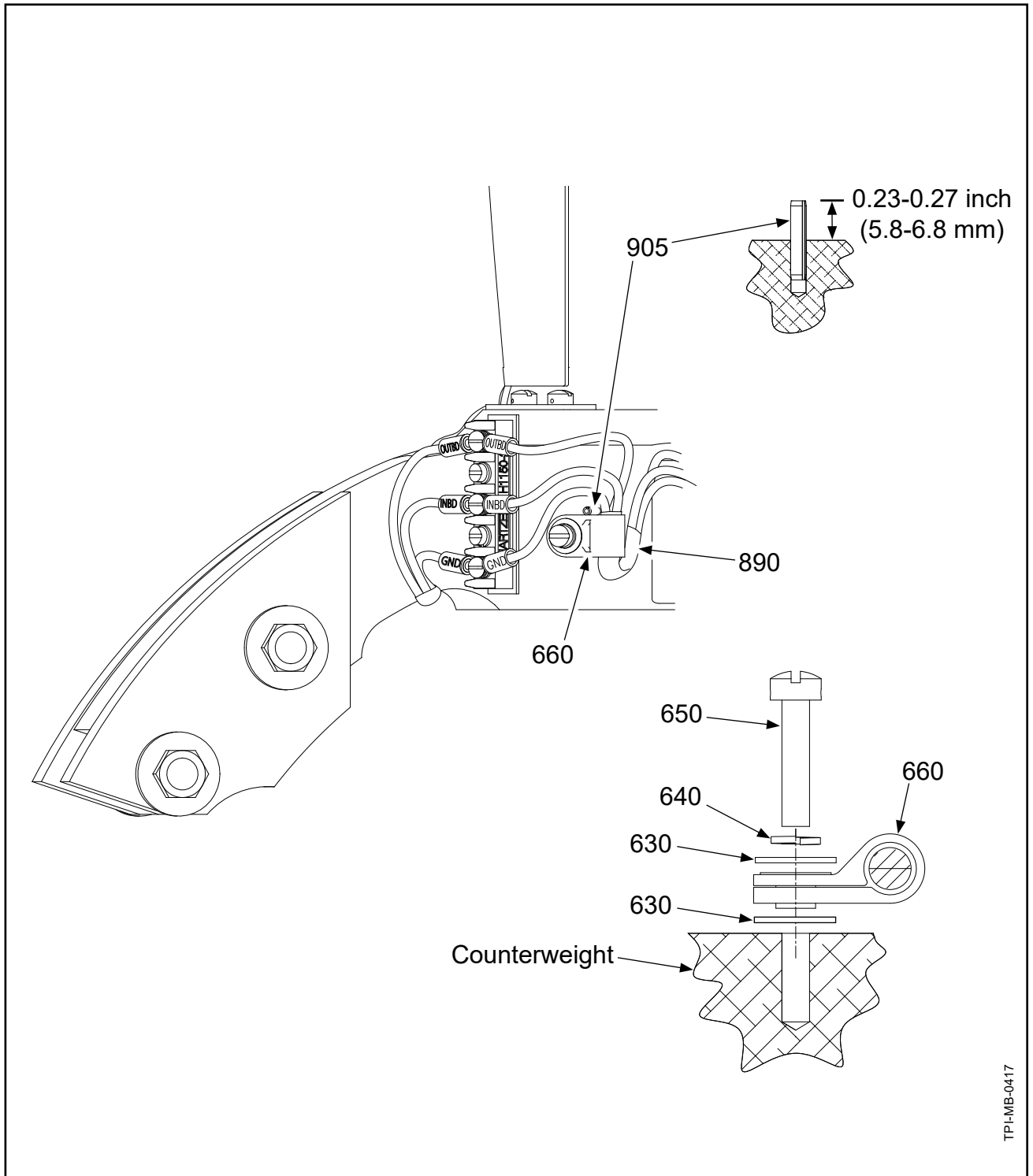
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**107982(X)**



**Terminal Strip: Counterweight Mounted  
Figure EE-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

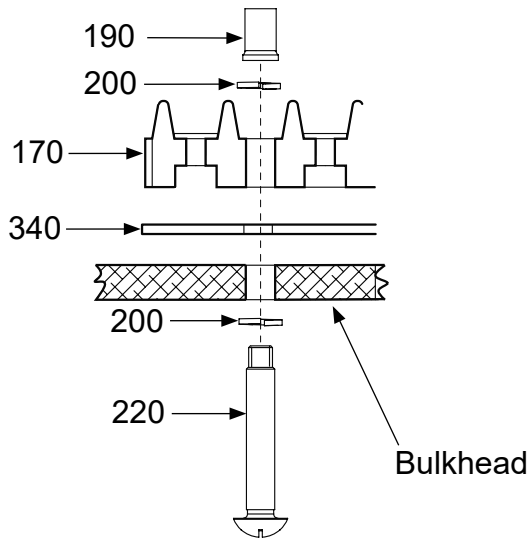
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**107982(X)**



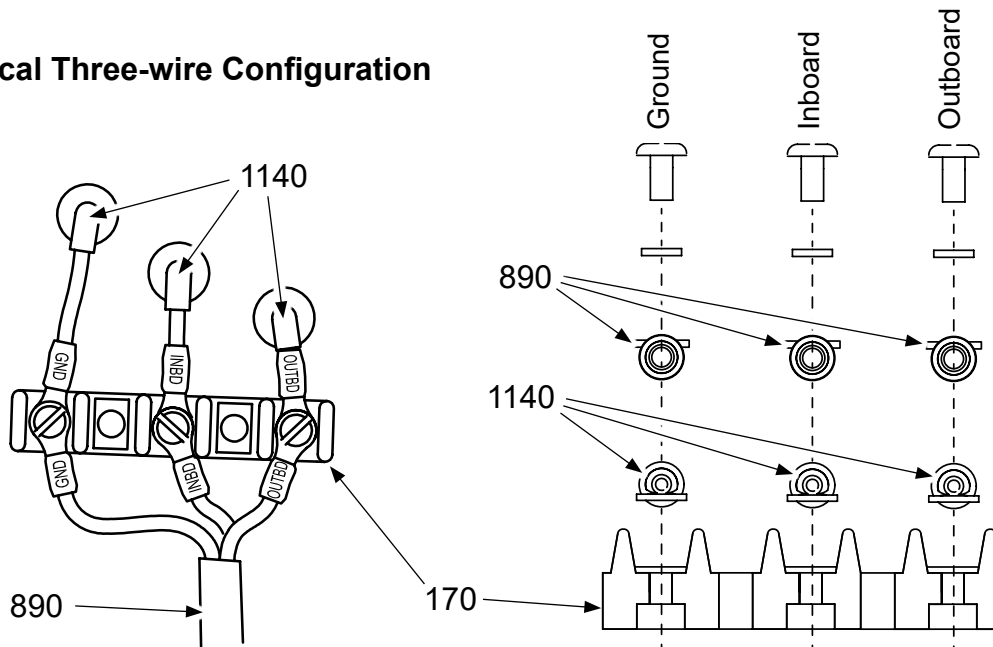
**Spring Pin/Loop Clamp Installation  
Figure EE-3**

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**107982(X)**



## Typical Three-wire Configuration



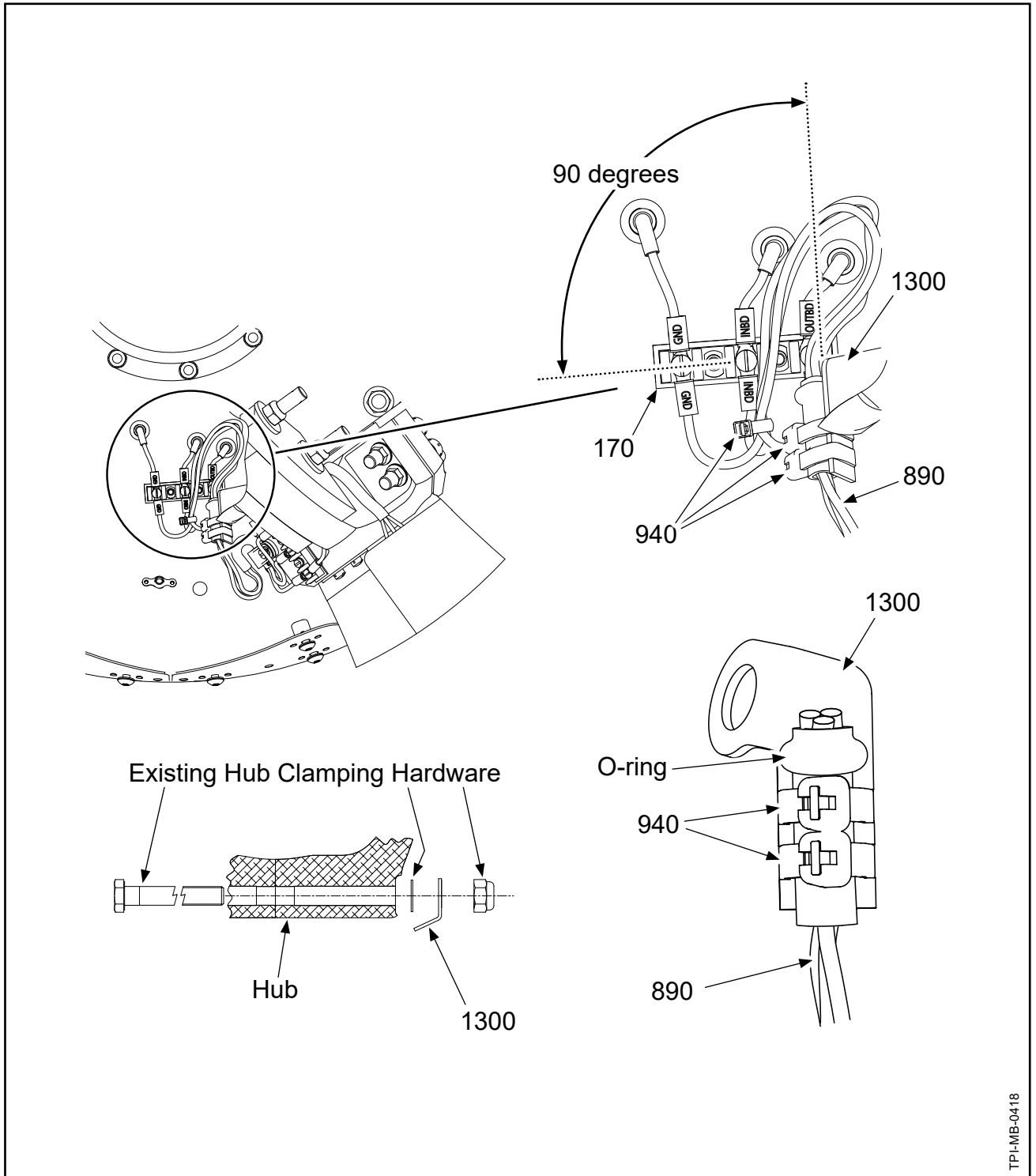
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TPI-MB-0139

**Terminal Strip: Bulkhead Mounted**  
**Figure EE-4**



# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**107982(X)**



**Wire Harness Bracket Installation**  
**Figure EE-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**107982(X)**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>107982(X)</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11EE</b> <b>FIGURES: EE-1 thru EE-5</b>		
170	1H1150-2	• TERMINAL BLOCK ASSEMBLY	10	
190	2H1365	• TAPPED EYELET	10	Y
200	B-3854-41	• WASHER, LOCK	30	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	10	Y
320	B-6631-231	• SCREW, 6-32, FILLISTER HEAD, CRES	10	Y
340	2H1852-2	• SPACER, TERMINAL STRIP	10	
620	B-3855-31	• DELETED	-	
630	B-3837-N832	• WASHER, CRES	10	Y
640	B-3854-42	• WASHER, LOCK	5	Y
650	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	5	Y
660	B-3853-F5	• CLAMP, LOOP, PLASTIC	5	Y
890	3H2526-2	• WIRE HARNESS	5	Y
905	B-3842-0500	• SPRING PIN, 3/32", CRES	5	Y
940	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	15	Y
1140	107978(X)	• SLIP RING ASSEMBLY	1	
1300	105558	• BRACKET, WIRE HARNESS	5	
1205	A-2070-6	• SCREW, 1/4-28, BUTTON HEAD	10	

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 107982(X)**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**103428**

**EF. Installation Instruction 11EF**

- (1) Using the bolts (1160), Belleville spring washers (1180), washers (1200), and nuts (1190), attach the slip ring (1140) to the spinner bulkhead and the spinner mounting plate as shown in Figure EF-1.
  - (a) Torque the bolts (1160) to 40-120 In-Lbs. (4.51-13.55 N•m).
  - (b) Perform a slip ring run-out check in accordance with the Check chapter in this manual.
- (2) Position the terminal block (170) on the bulkhead in accordance with Orientation A shown in Figure EF-2, then attach the terminal block to the bulkhead using screws (220) and washers (200).
  - (a) Torque the screws (220) to 10-12 In-Lbs. (1.2-1.3 N•m).
- (3) Position the propeller blades at reverse blade angle.
- (4) Slide the polyurethane tubing (1000) over the de-ice boot lead wires as shown in Figure EF-3.
  - (a) Put the ring terminals (1005) onto the de-ice boot lead wires, then crimp in accordance with the manufacturer's instructions.
- (5) Position the terminal block (170) on the counterweight/slug in accordance with Figure EF-4, then attach the terminal block to the counterweight/slug using screws (300) and washers (200).
  - (a) Torque the screws (300) to 10-12 In-Lbs. (1.2-1.3 N•m).
- (6) Attach the "equal length leads" from the wire harness (890) and the de-ice boot lead wires to the terminal block (170) on the counterweight/slug in accordance with Figure EF-4.
  - (a) Tighten the screws on the terminal block (170) until snug.
- (7) Using tie strap (400), attach the de-ice boot lead wires to the blade clamp as shown in Figure EF-5.
  - (a) Position the head of the tie strap (400) as shown in Figure EF-5.
- (8) Install the loop clamp (500) around the wire harness (890) and attach to the counterweight/slug using the screw (600) and washer (650) in accordance with Figure EF-5.
  - (a) Position the loop clamp (500) as shown in Figure EF-5.
  - (b) Torque the screw (600) to 22-25 In-Lbs. (2.5-2.8 N•m).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**103428**

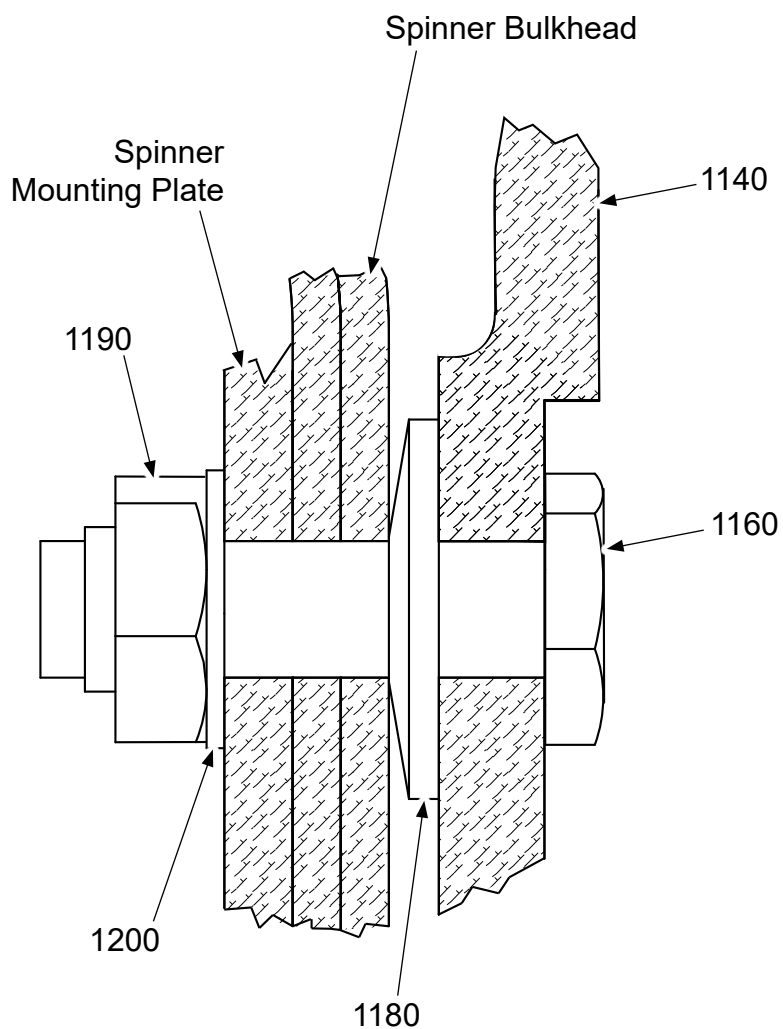
EF. Installation Instruction 11EF - continued

- (9) Attach the leads from the slip ring (1140) and de-ice wire harness (890) to the bulkhead terminal block (170) in accordance with Figure EF-6.
  - (a) Tighten the screws on the terminal block (170) until snug.
- (10) Install the loop clamp (500) around the wire harness (890) and attach to the bulkhead using the screw (510), washers (520), and nut (530) in accordance with Figure EF-6.
  - (a) Position the centerline of the loop clamp (500) as shown in Figure EF-6.
  - (b) Torque the screw (510) to 22-25 In-Lbs. (2.5-2.8 N•m).
- (11) Cycle the propeller from reverse angle to feather angle to verify proper wire harness (890) installation.
  - (a) Make sure the wire harness is not obstructed during cycling.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**103428**



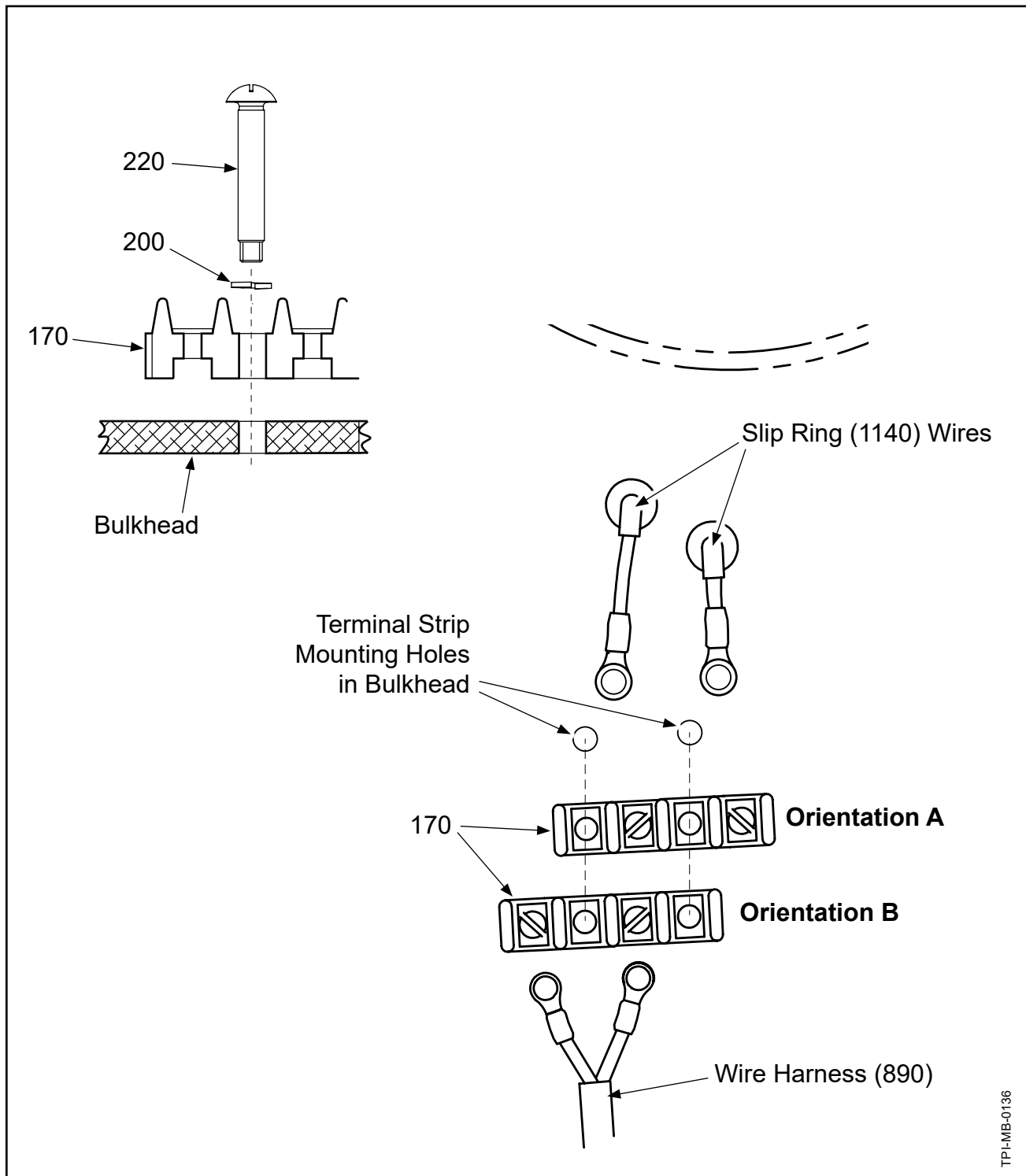
**Slip Ring Mounting  
Figure EF-1**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

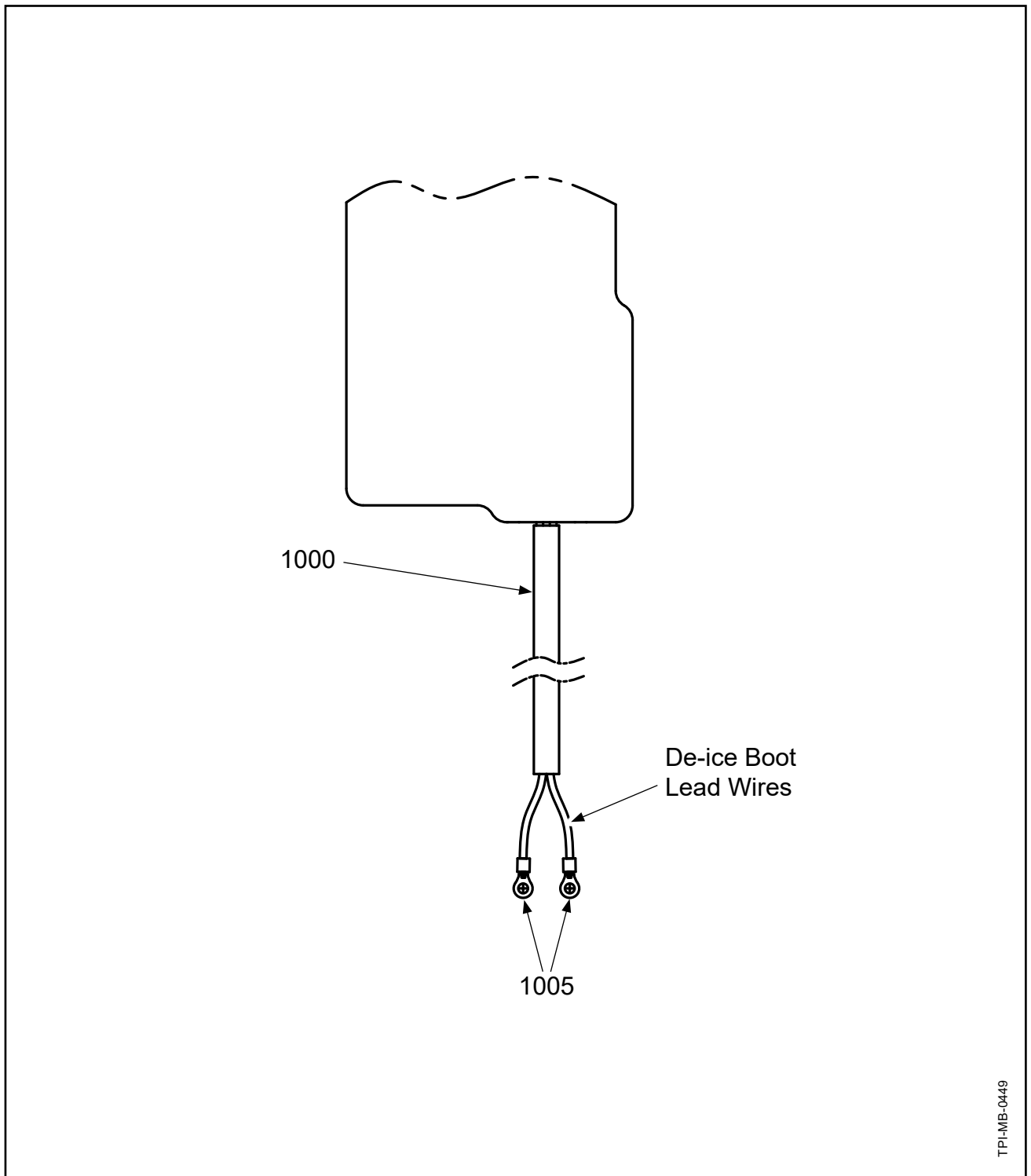
**103428**



**Terminal Strip Installation: Bulkhead Mounted**  
**Figure EF-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

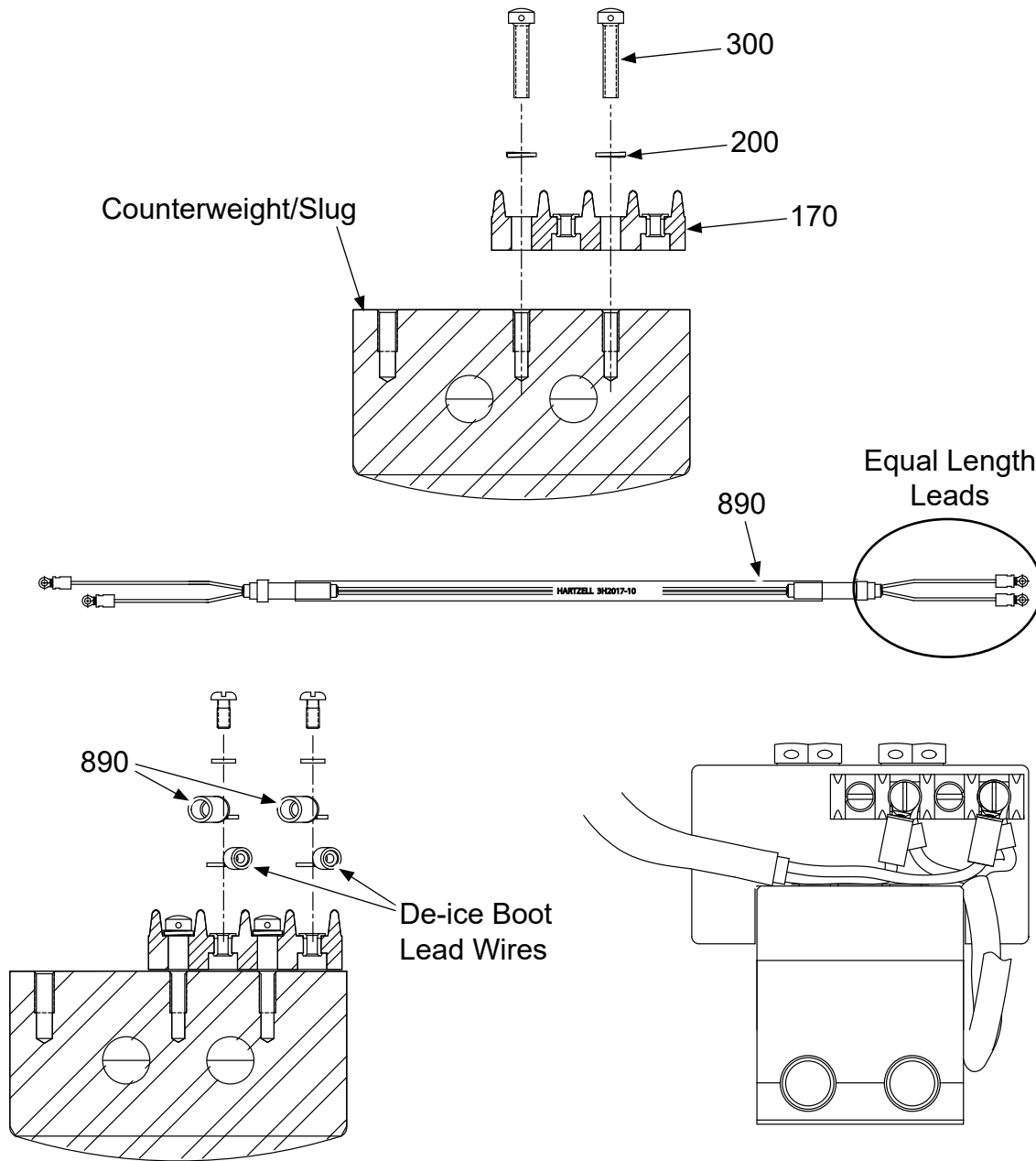
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103428**



**Polyurethane Tubing/Ring Terminal Installation  
Figure EF-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103428**



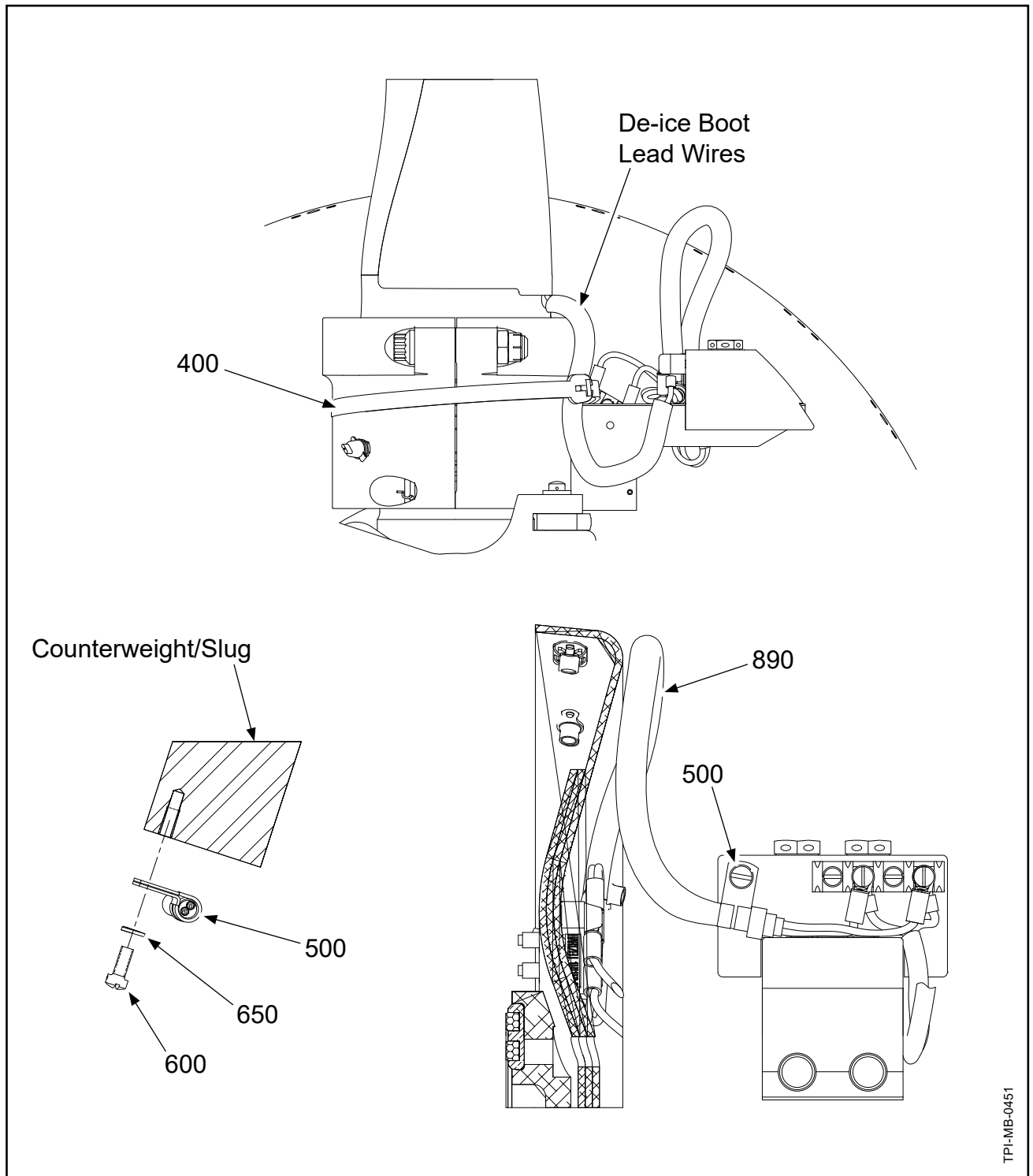
TPI-MB-0450

**Terminal Strip Installation: Counterweight Mounted  
Figure EF-4**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

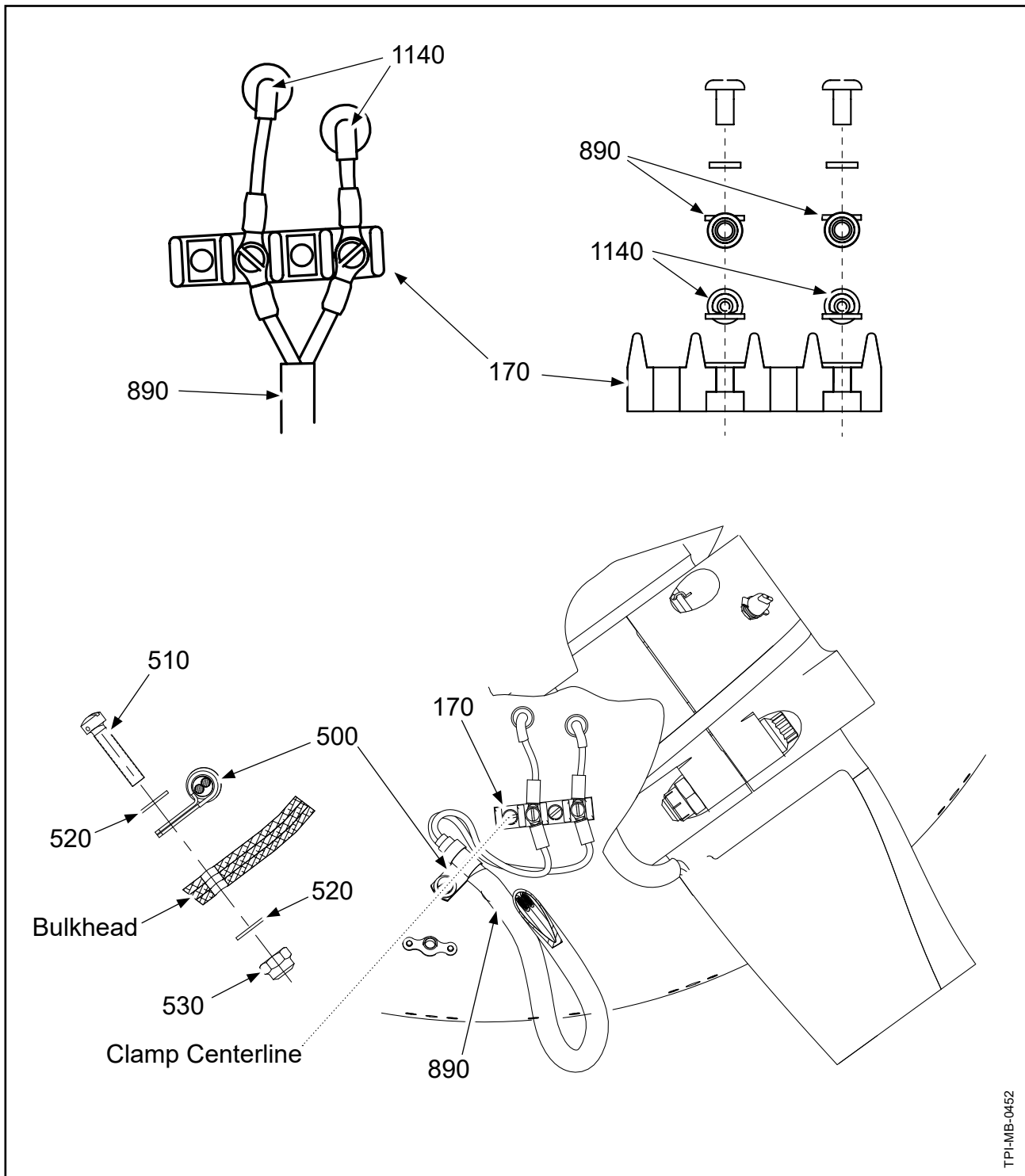
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103428**



**Securing the Lead Wires  
Figure EF-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**103428**



TP1-MB-0452

**Bulkhead Mounted Terminal Strip Lead Wire Connection  
Figure EF-6**

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**103428**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>103428</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11EF</b> <b>FIGURES: EF-1 thru EF-6</b>		
170	1H1150-3	• TERMINAL BLOCK ASSEMBLY	10	
200	B-3854-41	• WASHER, LOCK	20	Y
220	B-6631-233	• SCREW, 6-32, FILLISTER HEAD, CRES	10	Y
300	B-6631-231	• SCREW, 6-32, FILLISTER HEAD, CRES	10	Y
400	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	5	Y
500	B-6735	• CLAMP, LOOP, CUSHIONED	10	Y
510	B-3856-247	• SCREW, 8-32, FILLISTER HEAD, CRES	5	Y
520	B-3837-N832	• WASHER, CORROSION RESISTANT	10	Y
530	B-6655-08	• NUT, HEX, SELF-LOCKING	5	Y
600	B-3856-243	• SCREW, 8-32, FILLISTER HEAD, CRES	5	Y
650	B-3854-42	• WASHER, LOCK	5	Y
890	3H2017-10	• WIRE HARNESS	5	Y
1000	102676	• TUBING, POLYURETHANE	AR	Y
1005	108318	• TERMINAL, RING	10	
1140	4H2863	• SLIP RING ASSEMBLY	1	
1160	B-3874-10A	• BOLT, 1/4-28, HEX HEAD	10	Y
1180	B-7077-52	• BELLEVILLE SPRING WASHER	10	Y
1190	B-3808-4	• NUT, HEX, SELF-LOCKING	10	Y
1200	B-3837-0432	• WASHER, CORROSION RESISTANT	10	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 103428**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**103428**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**108424**

**EG. Installation Instruction 11EG**

- (1) Using the screws (1160), Belleville spring washers (1180), washers (1200), and nuts (1190), attach the slip ring (1140) to the spinner mounting plate and spinner bulkhead as shown in Figure EG-1.
  - (a) Torque the screws (1160) to 40-120 In-Lbs. (4.51-13.55 N•m).
- (2) Perform slip ring run-out check in accordance with the Check chapter of this manual.
- (3) Position the propeller blades at reverse blade angle.
- (4) Assemble the plug connection between the wire harness (890) and the de-ice boot.
- (5) Install the tie strap (910) around the wire harness/de-ice boot plug connection in accordance with Figure EG-2.
  - (a) Do not tighten the tie strap (910) at this time.
- (6) Secure the wire harness/de-ice boot plug connection to the clamp in accordance with Figure EG-2 and the steps below:
  - (a) Install two tie straps (930) under the tie strap (910) connecting the wire harness/de-ice boot plugs, and around the clamp.
  - (b) Position the two tie straps (930) between the lubrication fittings with the heads positioned in accordance with Figure EG-2.
  - (c) Do not tighten the tie straps (930) at this time.
- (7) Route the wire harness (890) under the inboard tie strap (930) and over the outboard tie strap (930) as shown in Figure EG-2.
- (8) Position the center of the wire harness/de-ice boot plug connection in line with the aft side of the counterweight within  $\pm 0.125$  inch (3.17 mm) as shown in Figure EG-2.
- (9) Using tie strap (920), secure the de-ice boot lead wire to the outboard tie strap (930) as shown in Figure EG-2.
  - (a) The tie strap (920) must cover the de-ice boot lead wire tubing.
  - (b) Do not tighten the tie straps (920) at this time.
- (10) Using tie strap (920), secure the wire harness (890) to the inboard tie strap (930) as shown in Figure EG-2.
  - (a) The tie strap (920) must be located within 0.125 inch (3.17 mm) of the blade clamp parting line.
  - (b) Do not tighten the tie straps (920) at this time.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

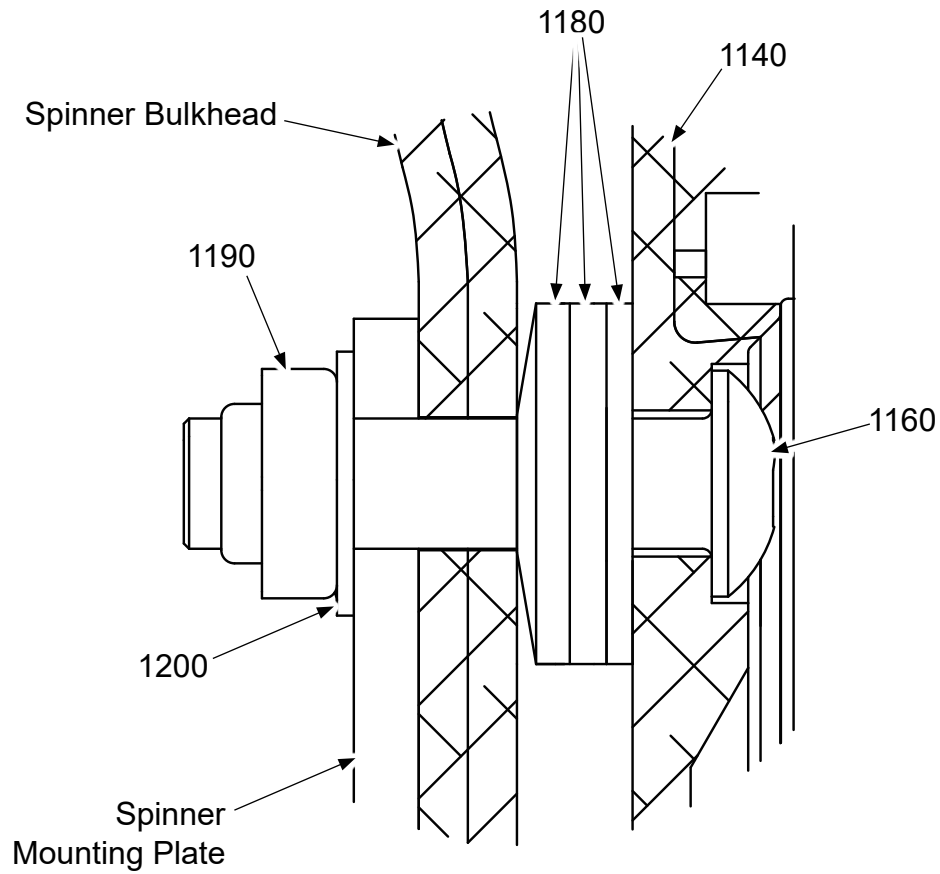
**108424**

**EG.**    Installation Instruction 11EG - continued

- (11) Position the wire harness/de-ice boot plug connection as shown in Figure EG-2, then tighten all tie straps (910, 920, 930).
- (12) Install one tie strap (930) around the inboard edge of the de-ice boot as shown in Figure EG-2.
- (13) Using screws (220), washers (200), attach the terminal strip (170) to the bulkhead in accordance with Orientation B in Figure EG-3.
  - (a) Torque the screws (220) 10-12 In-Lb. (1.12-1.35 N•m).
- (14) Attach the lead wires from the slip ring (1140) and de-ice wire harness (890) to the terminal strip (170) in accordance with Figure EG-3 and Figure EG-4.
  - (a) Connect the slip ring lead wires on opposing blades in accordance with Figure EG-4.
  - (b) Tighten the terminal screws until snug.
- (15) Install the loop clamp (590), around the wire harness (890) as shown in Figure EG-5.
- (16) Using screws (610), washers (620, 630), and nuts (600), install the loop clamp (590) to the bulkhead in accordance with Figure EG-5.
  - (a) Position the centerline of the loop clamp (590) perpendicular to the blade as shown in Figure EG-2.
  - (b) Torque the screw (610) to 22-25 In-Lbs. (2.48-2.82 N•m).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**108424**

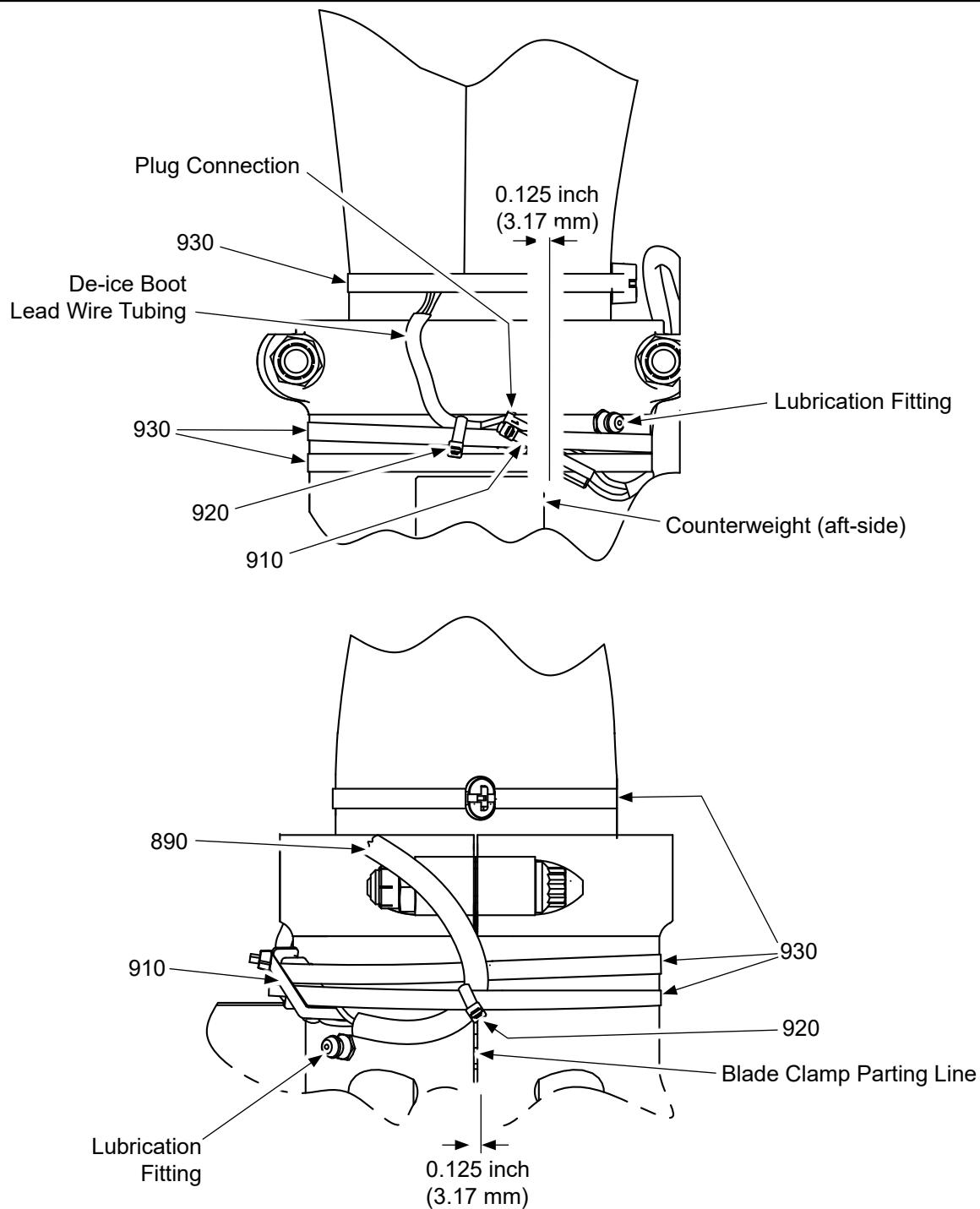


TPI-MB-0486

**Slip Ring Mounting  
Figure EG-1**

# **HARTZELL ICE PROTECTION SYSTEM MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**108424**



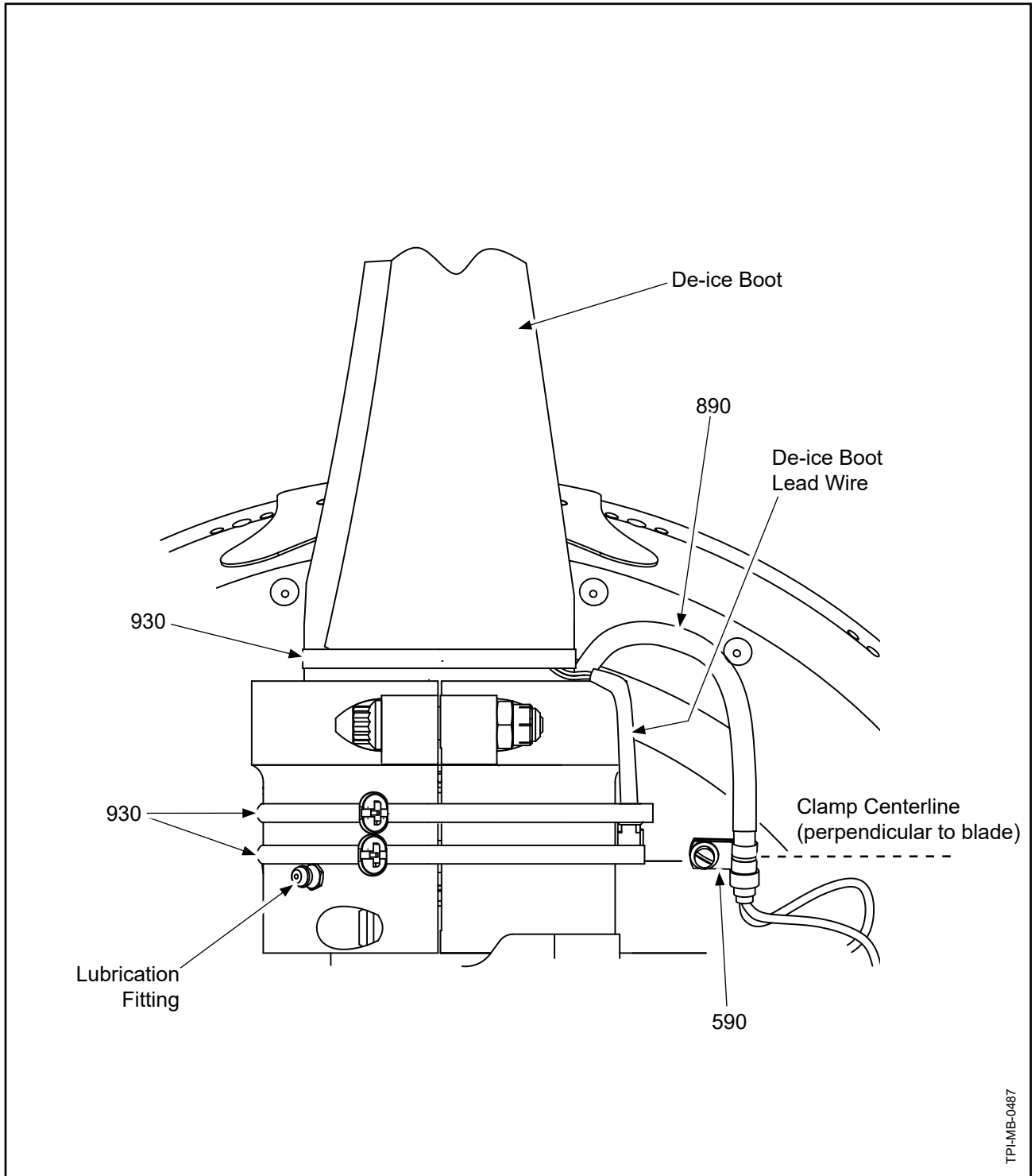
TPH-MB-0487

**Wire Harness and Tie Straps  
Figure EG-2, page 1 of 2**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

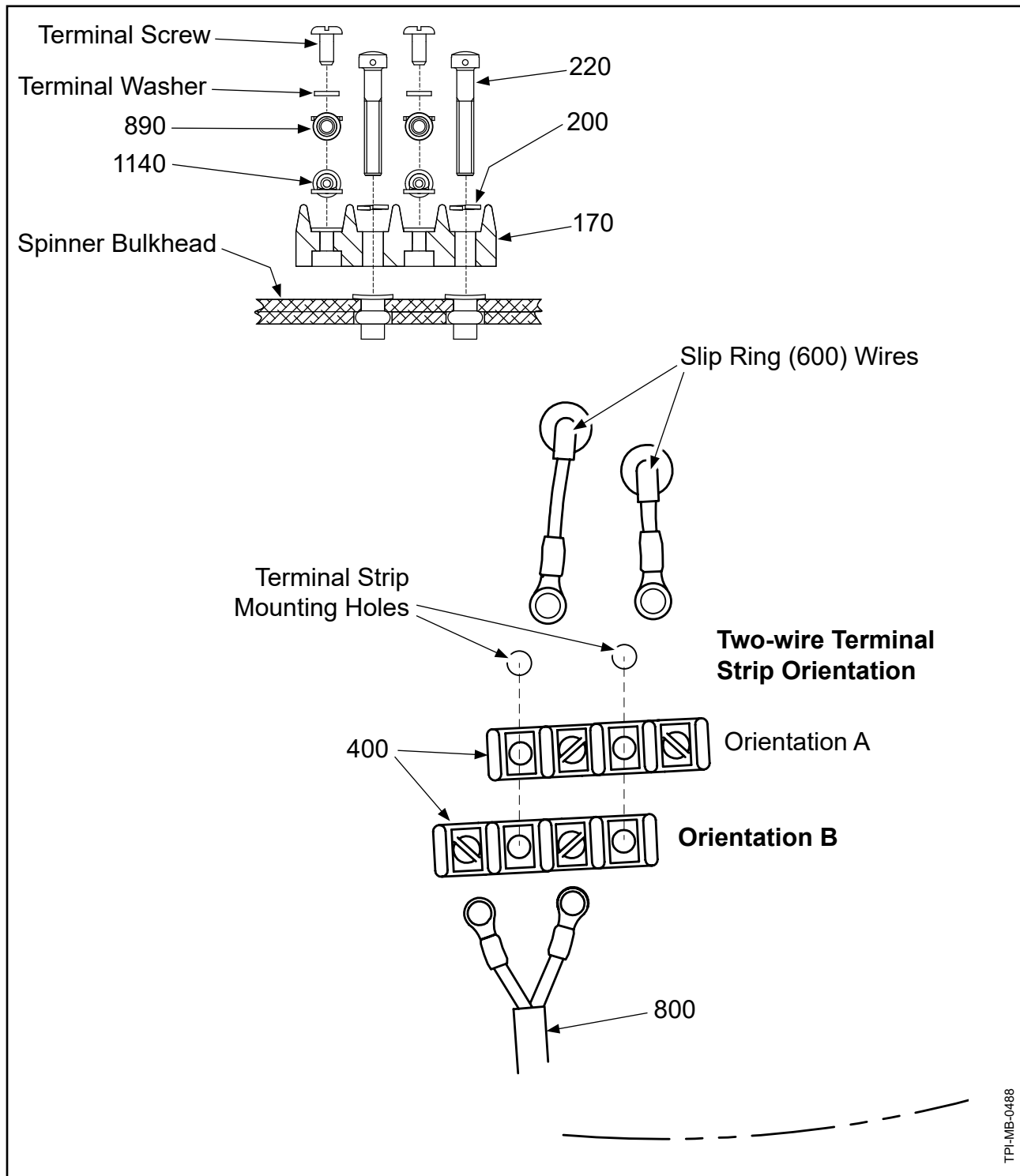
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**108424**



**Wire Harness and Tie Straps  
Figure EG-2, page 2 of 2**

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

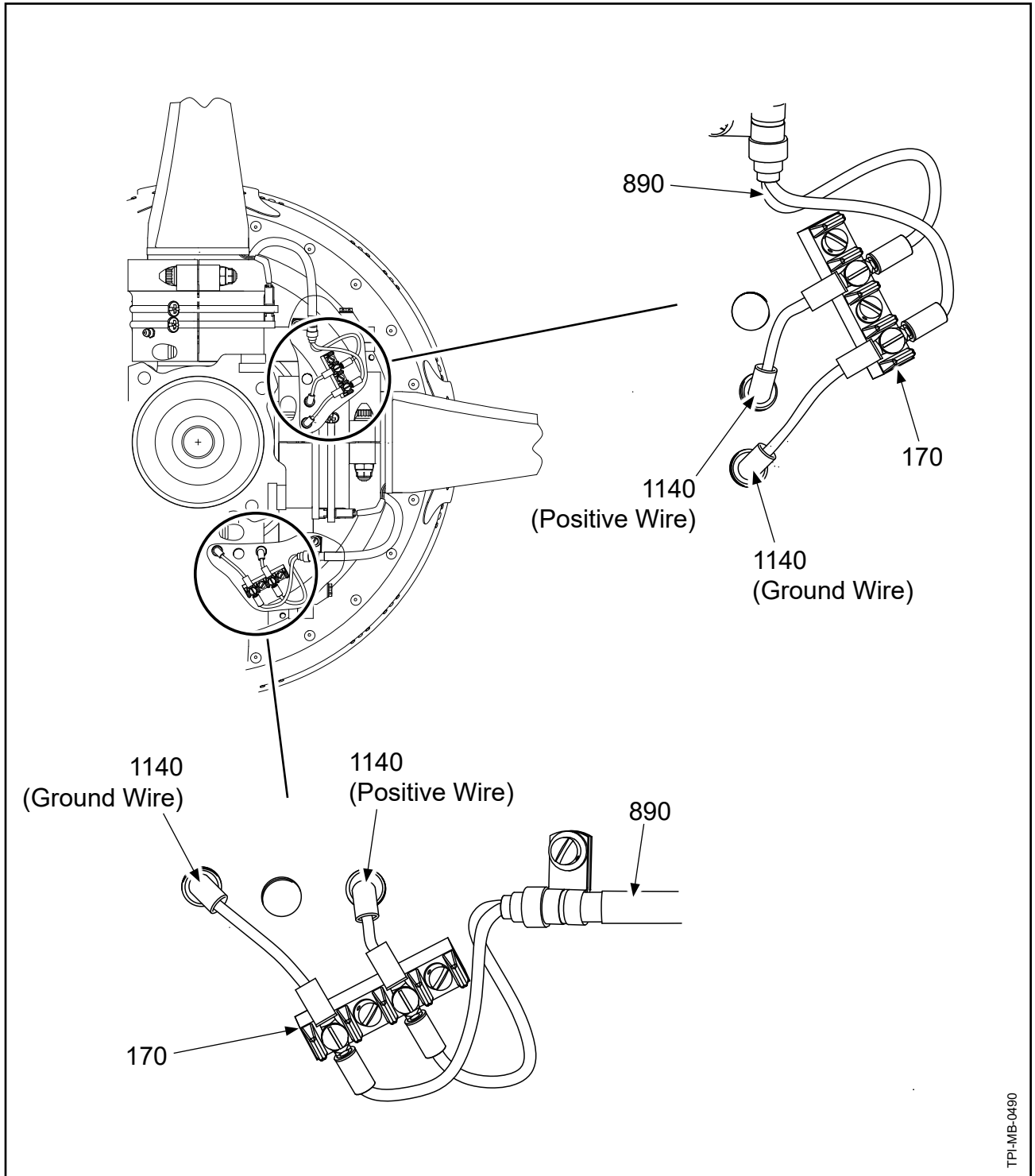
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**108424**



**Terminal Strip Mounting/Lead Wire Connection**  
**Figure EG-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

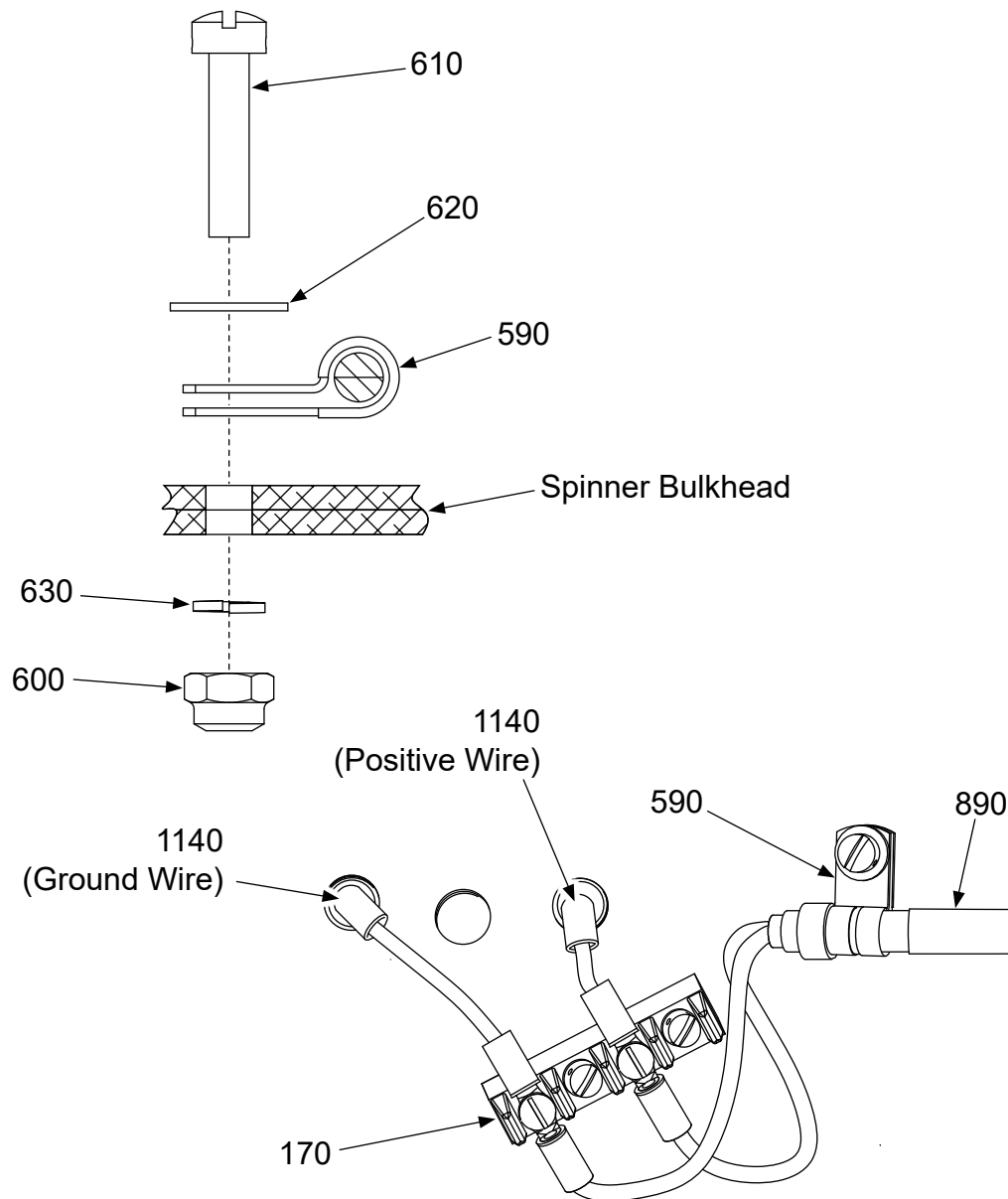
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**108424**



**Slip Ring Lead Wire Connections for Opposing Blades  
Figure EG-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**108424**



TP1-MB-0489

**Loop Clamp  
Figure EG-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**108424**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>108424</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11EG</b> <b>FIGURES: EG-1 thru EG-5</b>		
170	1H1150-3	• TERMINAL BLOCK ASSEMBLY	4	
200	B-3854-41	• WASHER, LOCK	8	Y
220	B-6631-233	• SCREW, 6-32, FILLISTER HEAD, CRES	8	Y
590	B-6735	• CLAMP, LOOP, CUSHIONED	4	Y
600	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
610	B-3856-246	• SCREW, 8-32, WASHER HEAD	4	
620	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
630	B-3854-42	• WASHER, CORROSION RESISTANT	4	Y
890	3H2092-2	• WIRE HARNESS	4	Y
910	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	4	Y
920	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	8	Y
930	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	12	Y
1140	108421	• SLIP RING ASSEMBLY	1	
1160	A-2070-8	• SCREW, 1/4-28, BUTTON HEAD	12	Y
1180	B-7077-52	• BELLEVILLE SPRING WASHER	36	Y
1190	B-3808-4	• NUT, HEX, SELF-LOCKING	12	Y
1200	B-3837-0432	• WASHER, CORROSION RESISTANT	12	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 108424**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**108424**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106863**

**EH.    Installation Instruction 11EH**

- (1) Using the screws (1205), attach the slip ring (1140), and the bulkhead to the hub as shown in Figure EH-1.
  - (a) Torque each screw (1205) to 8-10 Ft-Lbs (11-13 N•m).
  - (b) Perform a slip ring run-out check in accordance with the Check chapter in this manual.
- (2) Using screw (220), washers (200), and tapped eyelet (190), attach the terminal strip (170) to the bulkhead in accordance with Figure EH-2.
  - (a) Torque the screws (220) to 10-12 In-Lb (1.13-1.35 N•m).
- (3) Install the wire harness bracket (1300).
  - (a) Install one washer (1305), one washer (1310), one wire harness bracket (1300), the existing hub washer, and the existing hub clamping nut onto the hex head bolt (1315) in accordance with Figure EH-3.
  - (b) Position the wire harness bracket (1300) so that the long edge of the bracket is aligned with the middle hub clamping bolt as shown in Figure EH-4.
  - (c) Torque the hub clamping nut (dry) to 20-24 Ft-Lbs (27 - 33 N•m).
- (4) Position the propeller blades at low blade angle.
- (5) Assemble the plug connection between the wire harness (890) and the de-ice boot.
  - (a) Install one tie strap (930) around the wire harness/de-ice boot plug connection as shown in Figure EH-5. Do not tighten the tie strap.
    - 1    Position the head of tie strap (930) in the approximate location shown in Figure EH-5.
- (6) Route the terminal ends of the wire harness (890) through the hole in the counterweight as shown in Figure EH-5.
  - (a) Position the wire harness (890) so that equal lengths of the clear tubing are on each side of the counterweight.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106863**

**EH. Installation Instruction 11EH - continued**

- (7) Install the clamp (660) around the wire harness (890) with the O-ring positioned against the clamp as shown in Figure EH-5.
  - (a) Apply threadlocking adhesive CM399 to the threads of the screw (650).
  - (b) Using the screw (650), lockwasher (655), two washers (665), attach the clamp (660) to the counterweight in accordance with Figure EH-6.
    - 1 Torque the screw (650) to 22-25 In-Lbs.(2.5-2.8 N•m).
- (8) Secure the wire harness/de-ice boot plug connection to the counterweight.
  - (a) Install two tie straps (910) under the tie strap (930) that secures the plug connection, and around the counterweight/wire harness as shown in Figure EH-5. Do not tighten the tie straps.
    - 1 Position the heads of the two tie straps (910) as shown in Figure EH-5.
  - (b) Install one tie strap (910) under the counterweight and around the clear tubing on the wire harness (890) as shown in Figure EH-5. Do not tighten the tie strap.
    - 1 Make sure the tie strap (910) is over the clear tubing of the wire harness (890) on both sides of the counterweight.
    - 2 Install one tie strap (950) around the clear tubing on the wire harness (890) and the tie strap (910) on both sides of the counterweight as shown in Figure EH-5.
- (9) Make sure the wire harness/tie straps are positioned correctly, then tighten all of the tie straps in the following order:
  - (a) The tie strap (930) securing the wire harness/de-ice boot plug connection
  - (b) The three tie straps (910) around the wire harness/counterweight
  - (c) The two tie straps (950) around the tie strap (910)
- (10) Install one tie strap (940) around the wire harness (890) below the O-ring at the terminal-end of the harness (890) as shown in Figure EH-7.



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

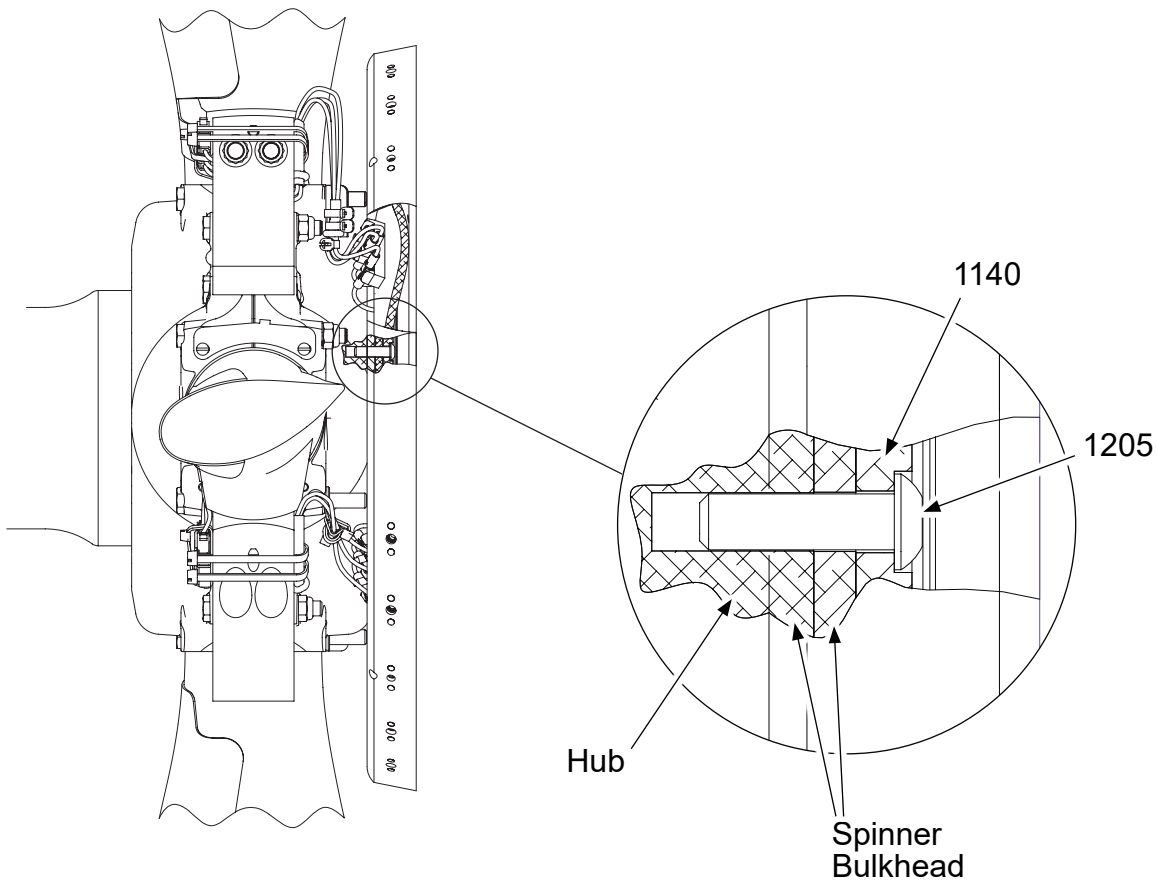
**106863**

**EH. Installation Instruction 11EH - continued**

- (11) Secure the wire harness (890) to the wire harness bracket (1300).
  - (a) Position the O-ring/shrink tubing on the terminal end of the wire harness (890) so that the O-ring is on top of the wire harness bracket (1300) as shown in Figure EH-8.
    - 1 Make sure the lead wires are not twisted or bent sharply.
  - (b) Install and tighten two tie straps (840) around the bracket and the shrink tubing on the wire harness as shown in Figure EH-8.
    - 1 Position the tie straps (840) in the grooves on the wire harness bracket (1300).
    - 2 Position the heads of the tie straps (840) as shown in Figure EH-8.
- (12) Install the lead wires from the slip ring (1140) and the lead wires from the wire harness (890) to the terminal strip (170) in accordance with Figure EH-9.
  - (a) Position the ring terminals as shown in Figure EH-9.
  - (b) Install the terminal screws and washers as shown in Figure EH-9.
  - (c) Tighten the terminal screws until snug.
- (13) Cycle the propeller from low angle to feather angle to verify correct wire harness installation. Make sure the wire harness is not blocked during cycling.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106863**



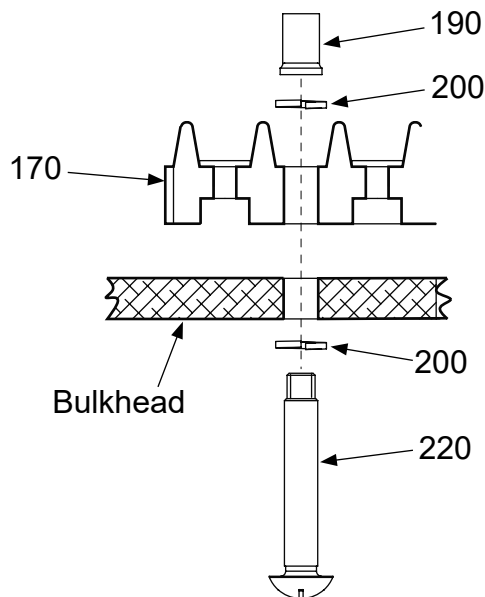
TPI-MB-0074

**Slip Ring Mounting  
Figure EH-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106863**



**Terminal Strip Hardware Configuration: Bulkhead Mounted  
Figure EH-2**

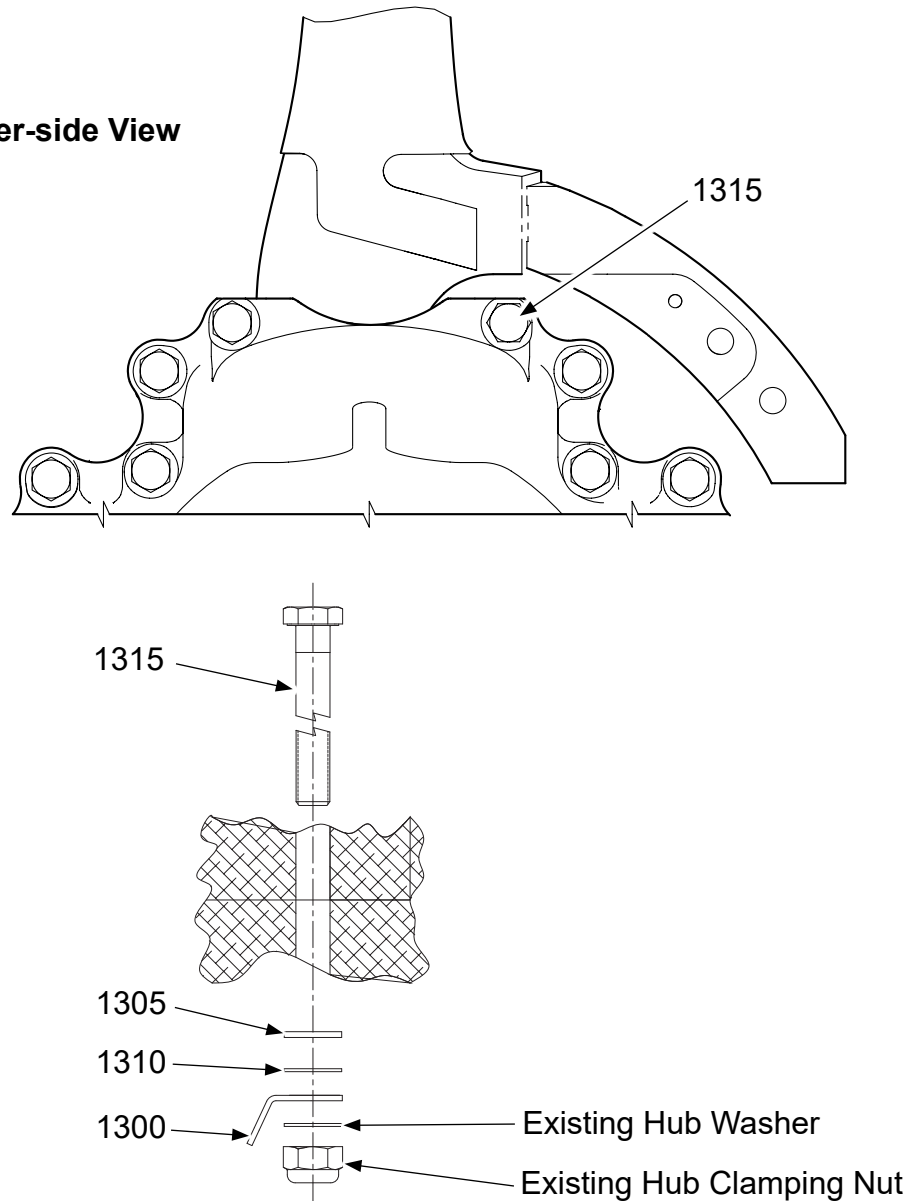
TPI-MB-0136

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106863**

**Cylinder-side View**



TPH-MB-0087-  
TPH-MB-0104

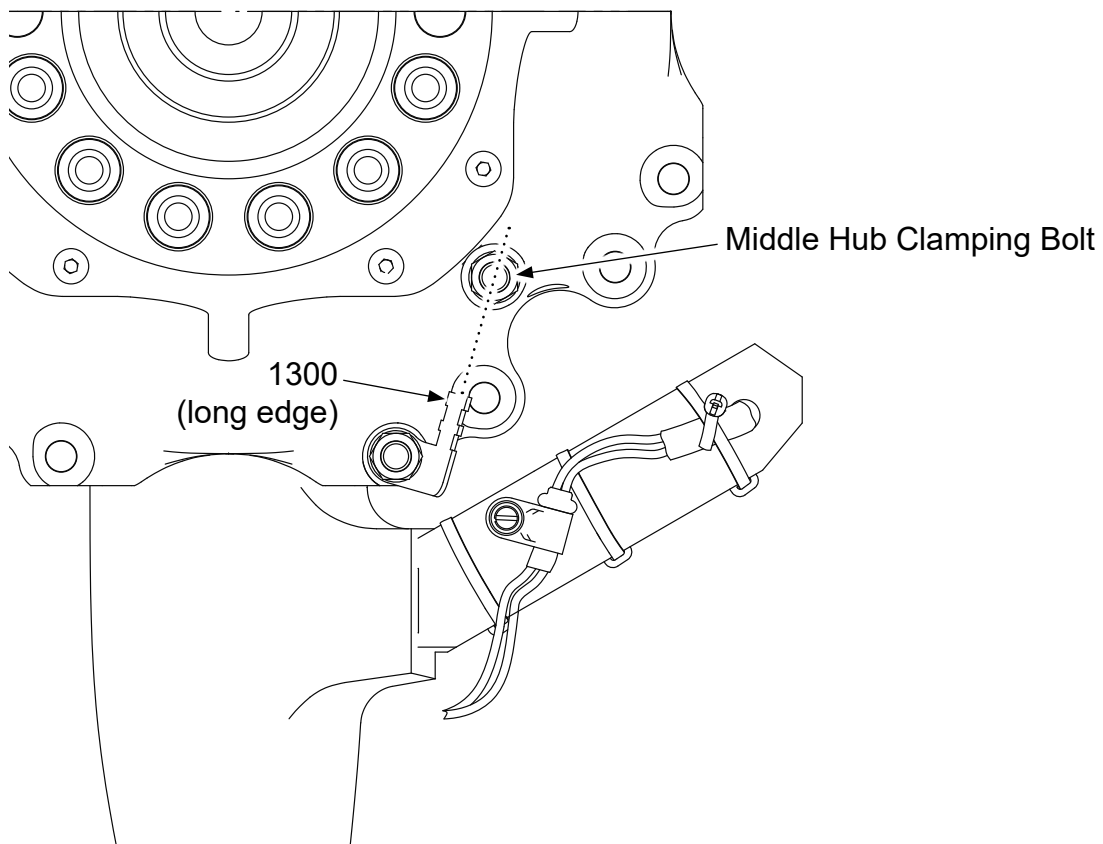
**Wire Harness Bracket Hardware Configuration  
Figure EH-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106863**

**Mounting Flange-side View**



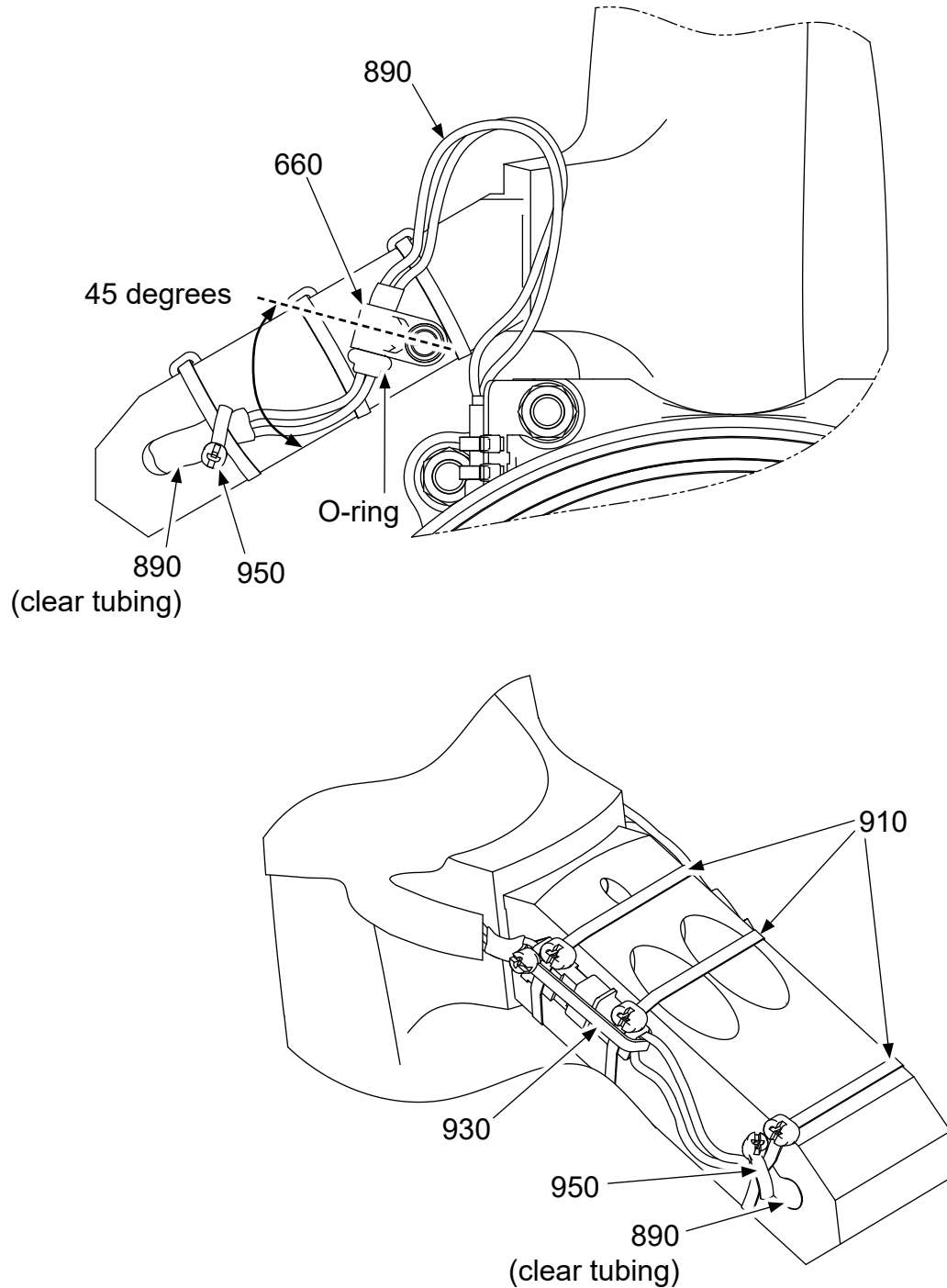
TPI-MB-0667

**De-ice Bracket Alignment  
Figure EH-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106863**

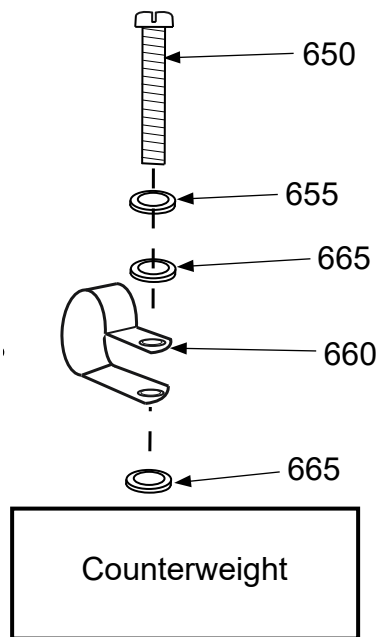


TPI-MB-0173

**Wire Harness-to-Counterweight  
Figure EH-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106863**



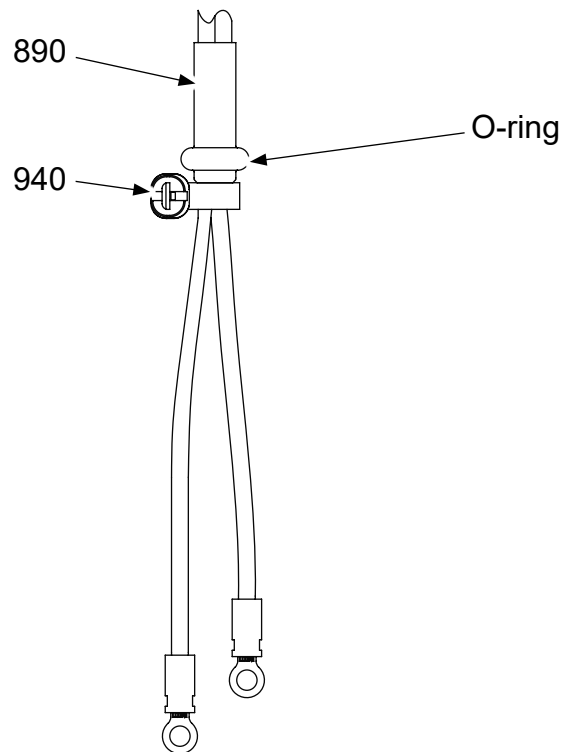
TL00180ACC  
TL00180BCC

**Loop Clamp to Counterweight Hardware Configurations  
Figure EH-6**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106863**



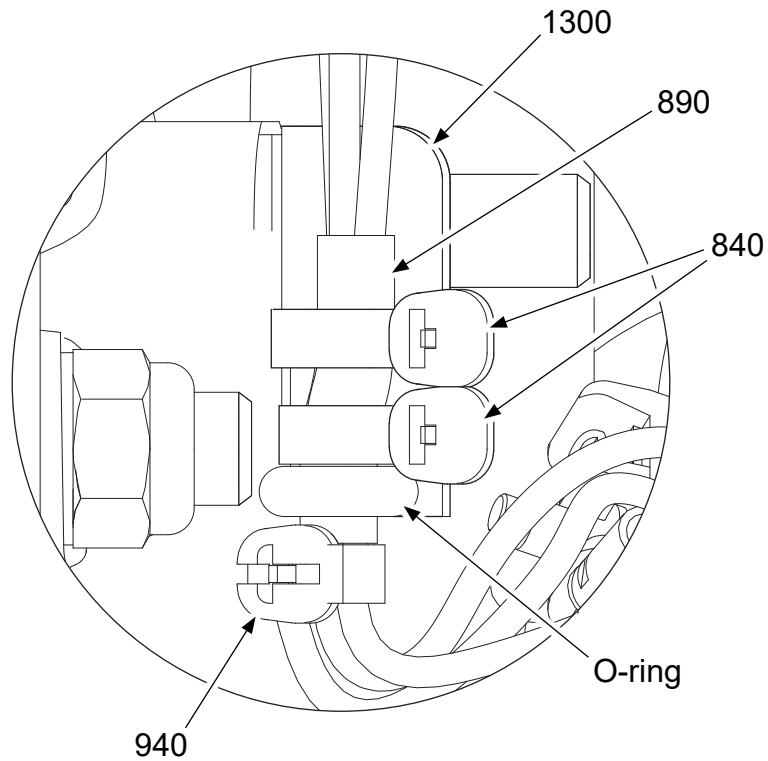
TPI-MB-0130

**Wire Harness Tie Strap Location  
Figure EH-7**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106863**



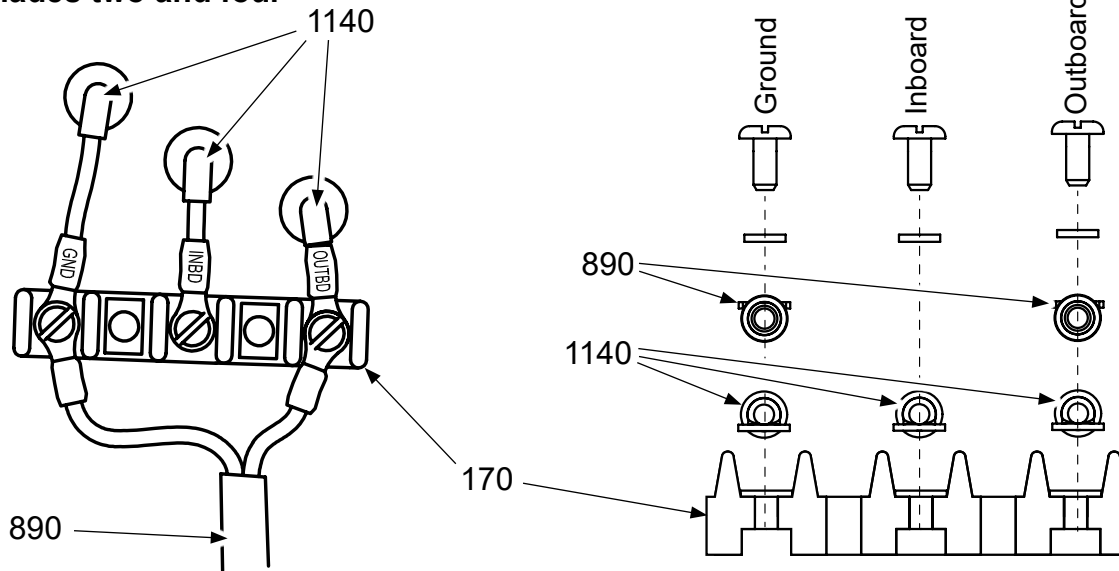
TPL-MB-0088

**Wire Harness to De-ice Bracket  
Figure EH-8**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

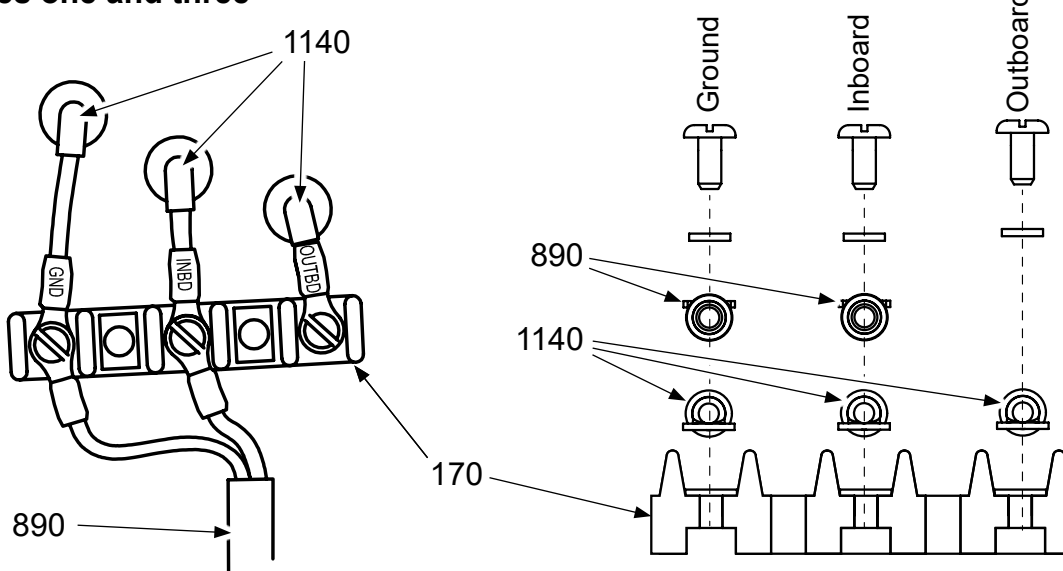
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106863**

**Blades two and four**



**NOTE:** The illustrations show slip ring wires on a typical right-hand (rotation) propeller.

**Blades one and three**



TP1-MB-0133

**Crossfire Configuration**

**Terminal Strip Lead Wire Configuration: Crossfire Configuration  
Figure EH-9**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**106863**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>106863</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11EH FIGURES: EH-1 thru EH-9</b>		
170	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM	4	
190	2H1365	• TAPPED EYELET	8	Y
200	B-3854-41	• WASHER, LOCK	16	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	8	Y
650	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
655	B-3854-42	• WASHER, LOCK	4	Y
660	B-3853-F5	• CLAMP, LOOP, PLASTIC	4	Y
665	B-3837-N832	• WASHER, CORROSION RESISTANT	8	Y
840	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
890	106575	• WIRE HARNESS	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	12	Y
930	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	4	Y
940	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	4	Y
950	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	8	Y
1140	106861	• SLIP RING ASSEMBLY	1	
1205	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	8	Y
1300	B-6265	• BRACKET, WIRE HARNESS	4	
1305	B-3834-0663	• WASHER	4	Y
1310	B-3834-0632	• WASHER	4	Y
1315	102691	• BOLT, 3/8-24, HEX HEAD	4	

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 106863**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**106863**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**108052**

**EI.     Installation Instruction 11EI**

- (1) Using the screw (100), two washers (200), tapped eyelet (300), attach the terminal strip (400) to the bulkhead in accordance with Orientation B in Figure EI-1.
  - (a) Torque the screw (100) to 10-12 In-Lb (1.2-1.3 N•m).
- (2) Using the screws (500), attach the slip ring (600) and the bulkhead to the hub in accordance with Figure EI-2.
  - (a) Torque each screw (500) to 8-10 Ft-Lbs (10.9-13.5 N•m).
- (3) Complete a slip ring run-out check in accordance with the Check chapter in this manual.
- (4) Put the propeller blades at reverse blade angle.
- (5) If required, press the spring pin (700) perpendicularly into the hole in the counterweight as shown in Figure EI-3. The spring pin must extend to a height of 0.170 - 0.210 inch (4.32 - 5.33 mm).

**NOTE:**     The counterweight may have been drilled for the spring pin (700) or may have an integral (cast) pin in place of the spring pin.

- (6) Assemble the plug connection between the wire harness (800) and the de-ice boot.
- (7) Install the wire harness/de-ice boot plug connections in the groove in the counterweight against the spring pin (700) or integral cast pin as shown in Figure EI-4.
- (8) Install the tie strap (900) in the retaining grooves of the counterweight and around the counterweight, and between the wires of the wire harness/de-ice boot plug connection as shown in Figure EI-4.

**CAUTION:**     ROUTING THE TIE STRAP (900) INCORRECTLY CAN CAUSE AN ELECTRICAL SHORT IN THE DE-ICE SYSTEM.

- (a) On the boot-side of the plug connection, install the tie strap (900) over pin location 3 on the connector and the spring pin (700) as shown in Figure EI-4.
  - (b) On the wire harness-side of the plug connection, install the tie strap (900) between wire 1 and wire 2 as shown in Figure EI-4.
  - (c) Position the head of tie strap (900) in the approximate location shown in Figure EI-4.
- (9) Using the tie strap (910), attach the de-ice boot lead wires to the tie strap (900) as shown in Figure EI-4.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

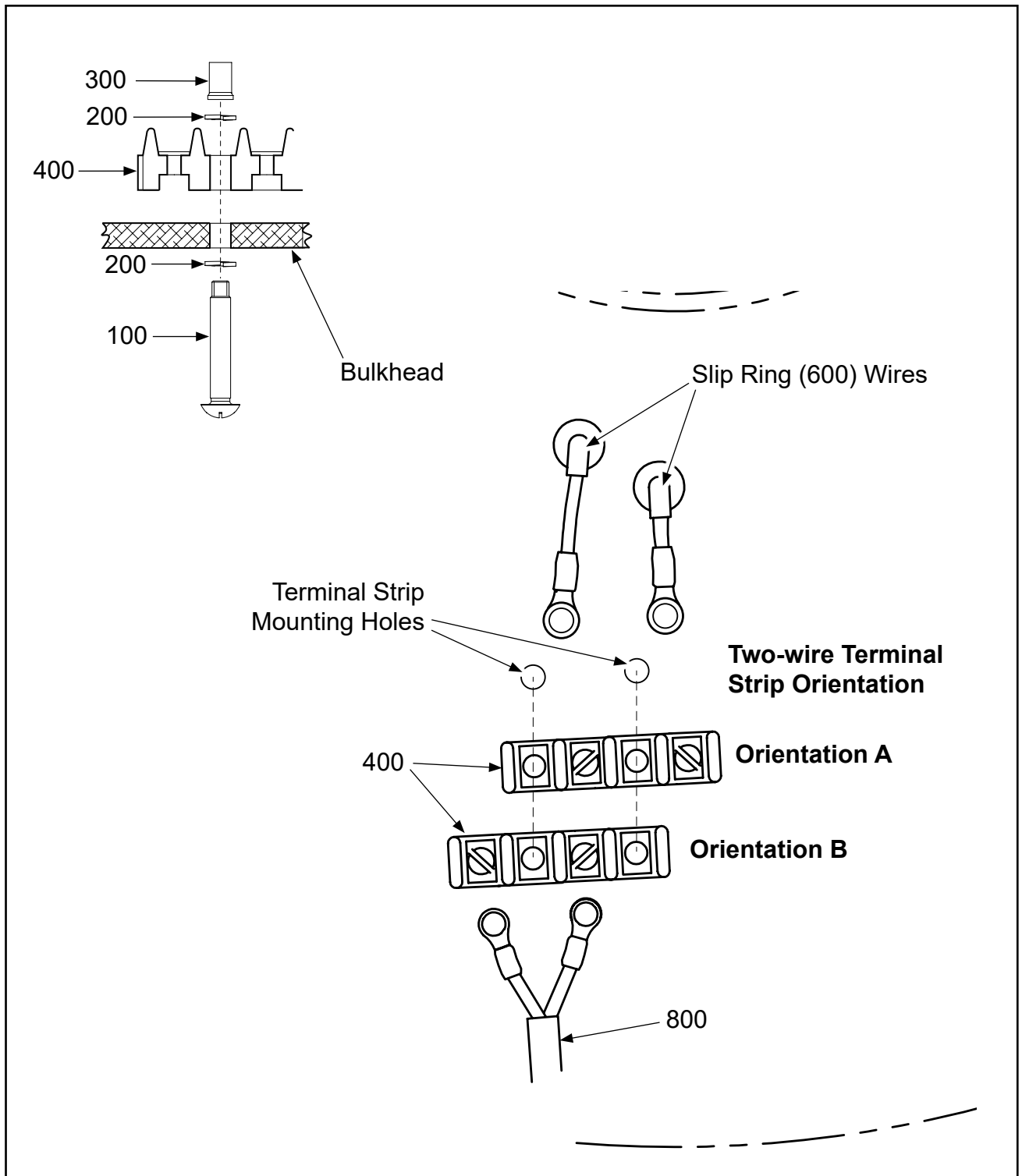
**108052**

**EI.    Installation Instruction 11EI - continued**

- (10) Install the tie strap (920) around the blade shank and over the de-ice boot lead wires as shown in Figure EI-4 and Figure EI-5.
  - (a) The head of tie strap (920) must be positioned in line with the balance weight hole when the propeller is in feather position as shown in Figure EI-5.
- (11) Install the clamp (1000), around the wire harness (800) and position against the O-ring as shown in Figure EI-6.
- (12) Position the centerline of the clamp (1000) parallel to the hub surface as shown in Figure EI-6.
- (13) Apply threadlocker CM399 to the threads of the screw (1100).
- (14) Using screw (1100) and washers (1200), install the clamp (1000) to the counterweight in accordance with Figure EI-6.
  - (a) Torque the screw (1100) to 20-22 In-Lb (2.3-2.4 N•m).
- (15) Install the wire harness bracket (1300) and washers (1400) on the the hub clamping bolt (1500) in accordance with the applicable configuration in Figure EI-7.
  - (a) Position the wire harness bracket (1300) parallel to the blade as shown in Figure EI-7.
  - (b) Install the hub clamping nut.
  - (c) Torque the hub clamping nut to 22-25 Ft-Lb (28-29 N•m).
    - 1    A minimum of one thread must be visible above the hub clamping nut after it is torqued.
- (16) Attach the wire harness (800) to the wire harness bracket (1300) as shown in Figure EI-8.
  - (a) Position the wire harness (800) on the bracket (1300) with the O-ring on top of the bracket as shown in Figure EI-8.
  - (b) Attach the wire harness (800) to the bracket (1300) with the tie straps (930). Twisting of the lead wires is not permitted.
- (17) Attach the lead wires from the slip ring (600) and de-ice wire harness (800) to the terminal strip (400) in accordance with the applicable configuration in Figure EI-9.
  - (a) Tighten the terminal screws until snug.
- (18) Cycle the propeller blades from reverse angle to feather angle to verify proper wire harness installation.
  - (a) Make sure the wire harness is not blocked during cycling.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

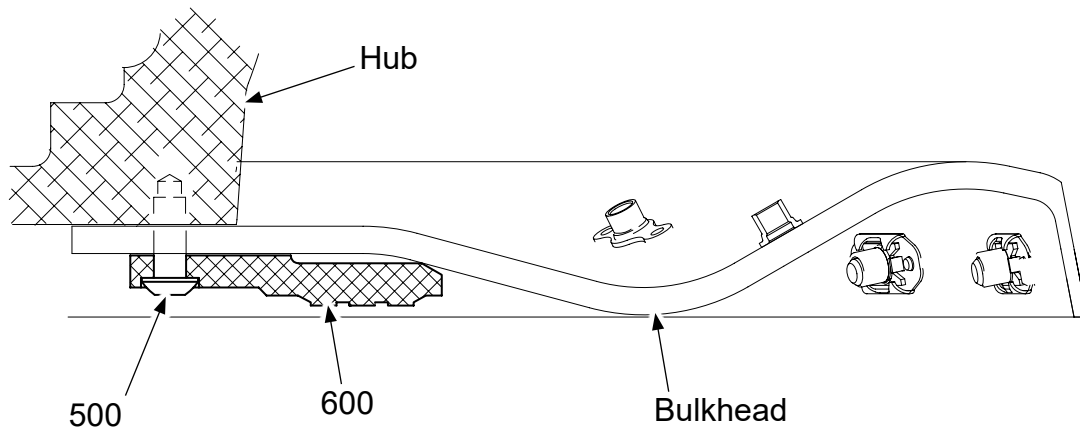
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**108052**



**Terminal Strip: Bulkhead Mounted  
Figure EI-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**108052**



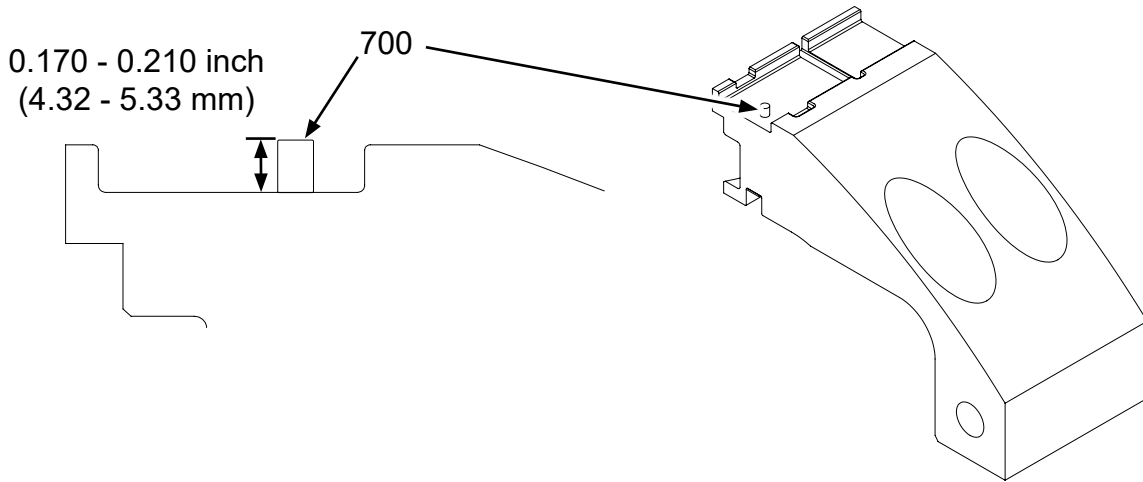
TPL-MB-0223

**Slip Ring Mounting  
Figure EI-2**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**108052**



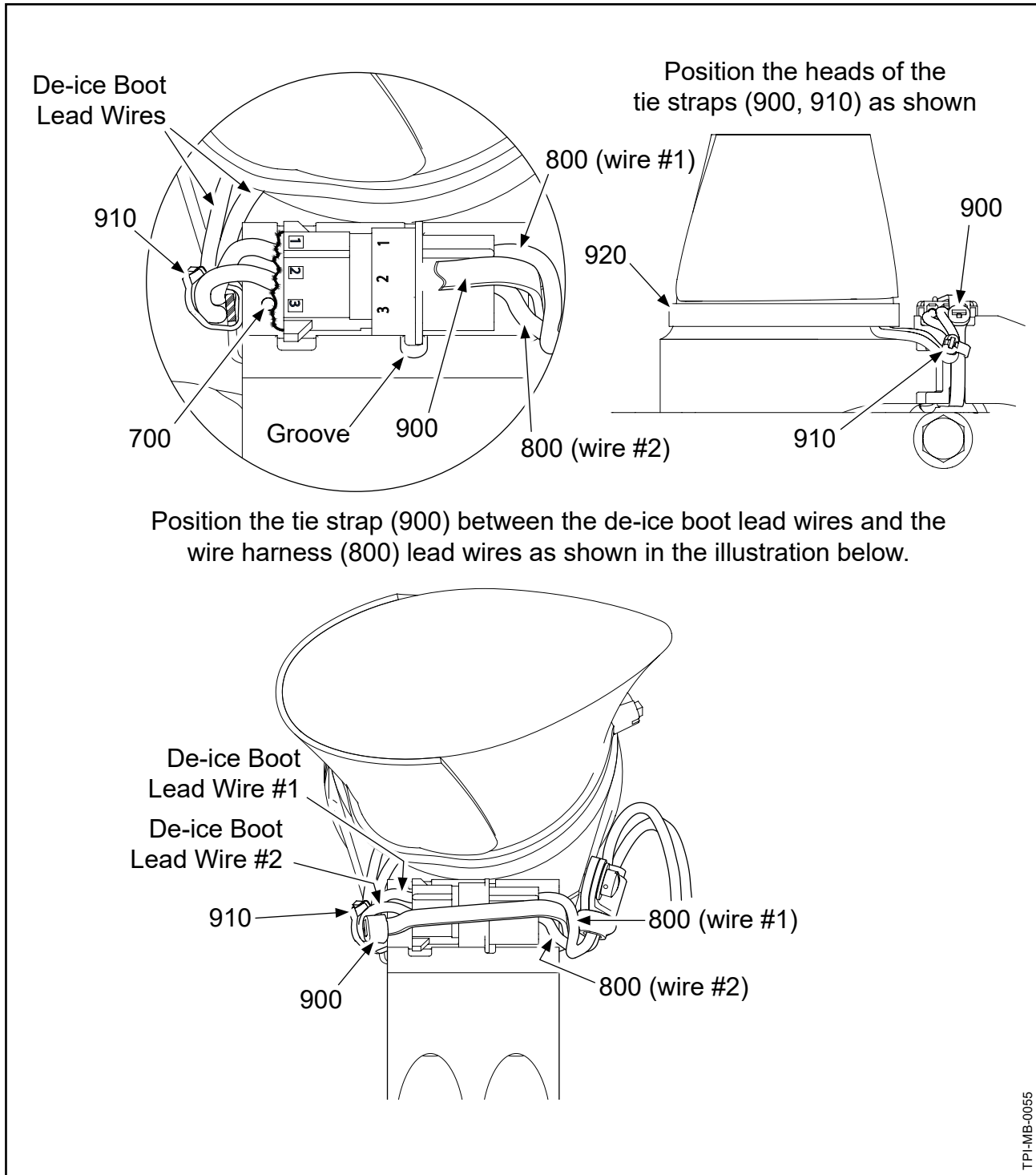
TPI-MB-0078

**Spring Pin Height  
Figure EI-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**108052**

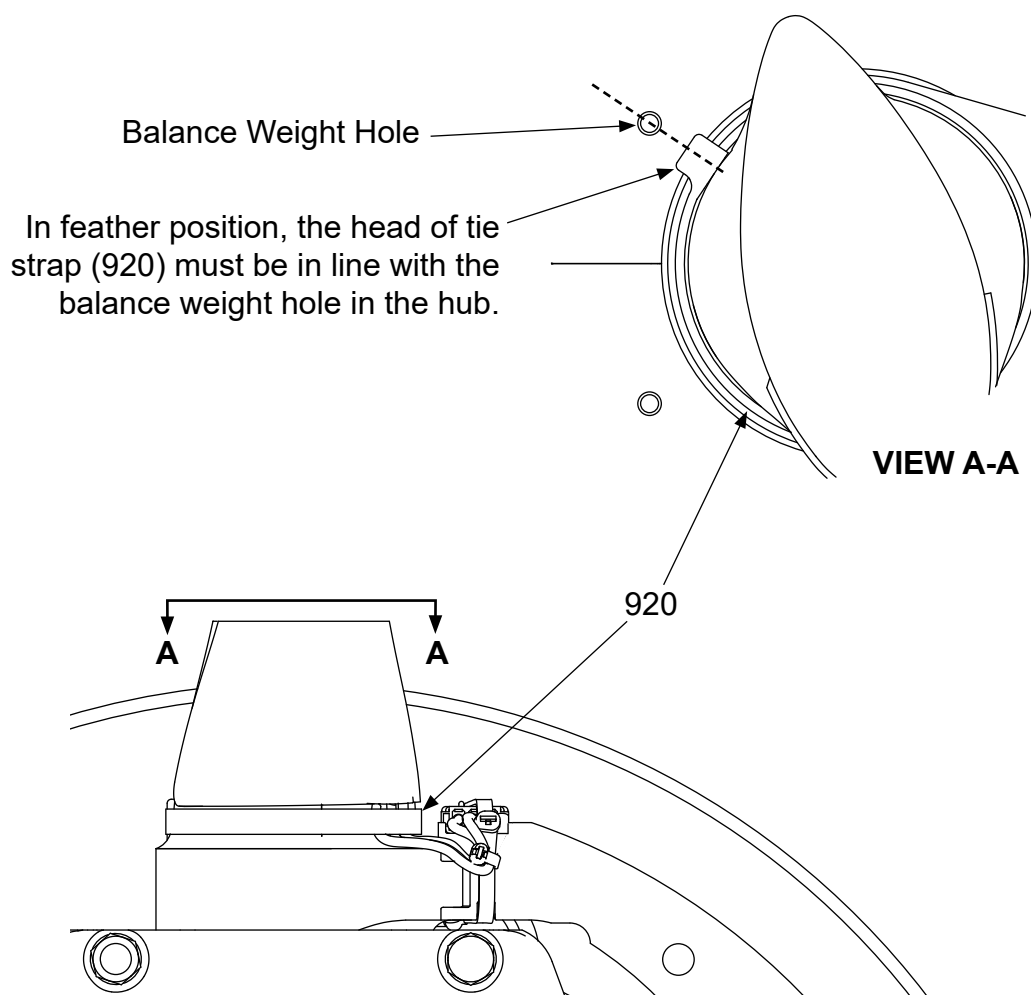


**Wire Harness to Blade Shank/Counterweight  
Figure EI-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**108052**



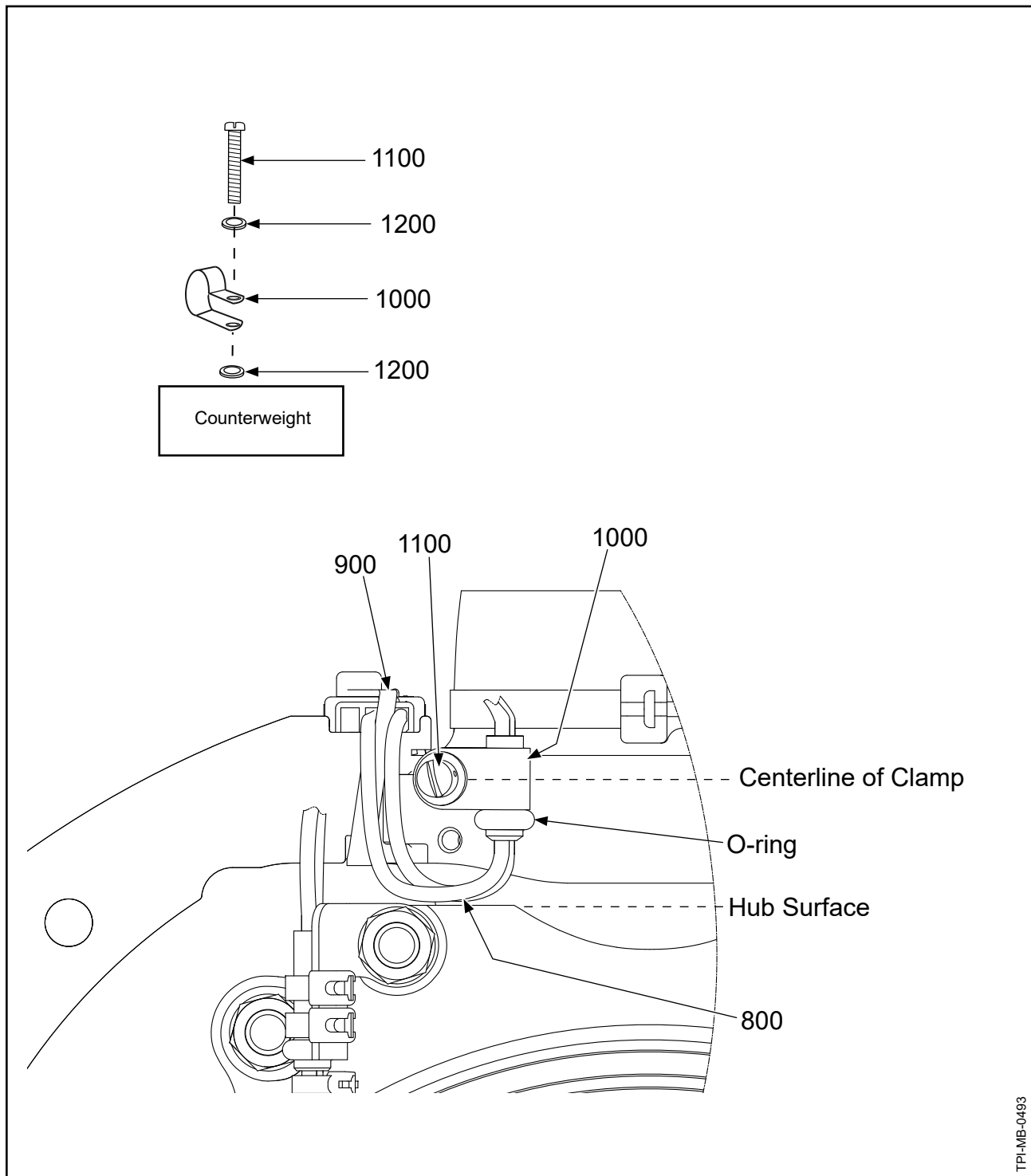
**Tie Strap Head Position  
Figure EI-5**

TPI-MB-0492

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**108052**

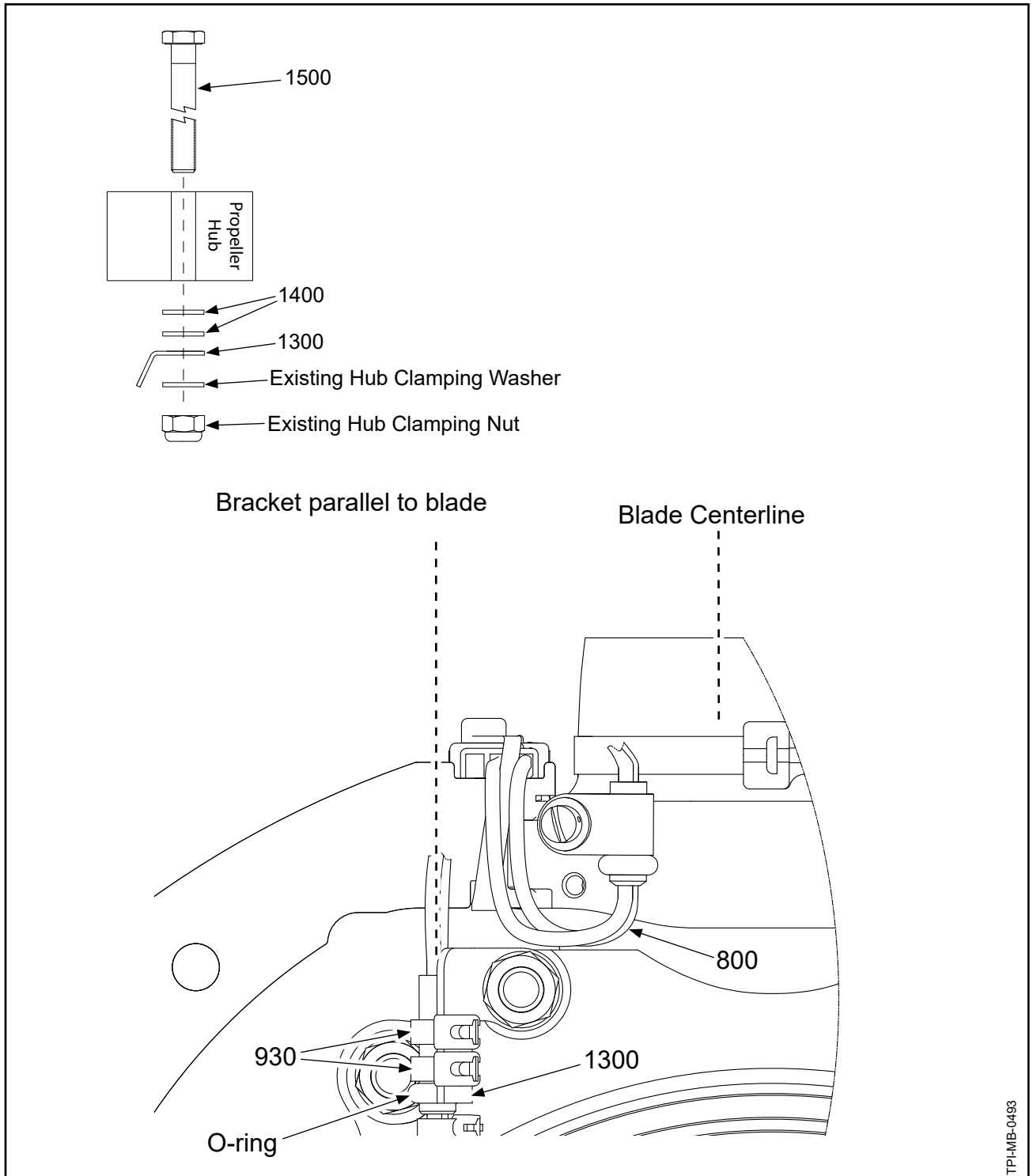


**Loop Clamp Orientation  
Figure EI-6**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**108052**

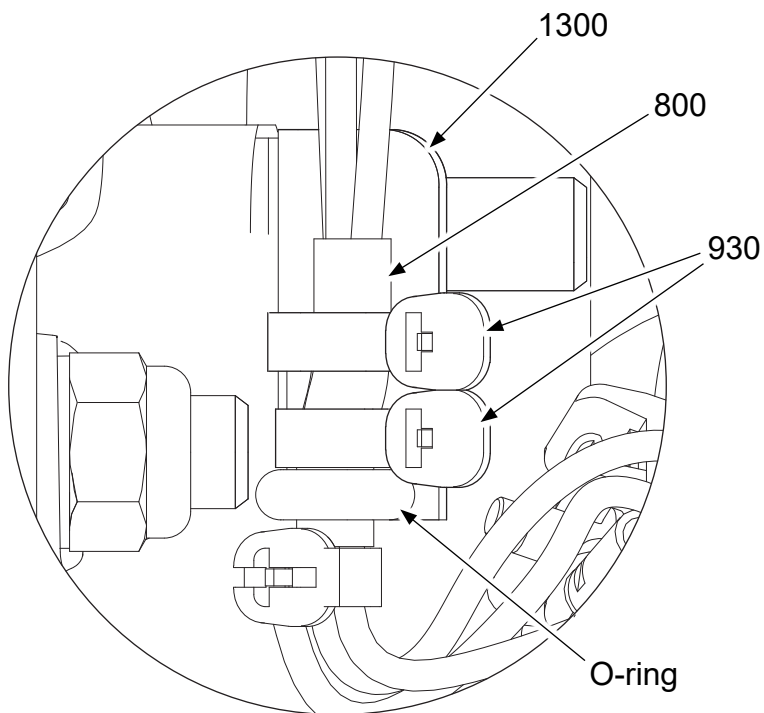


**Wire Harness Bracket  
Figure EI-7**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**108052**



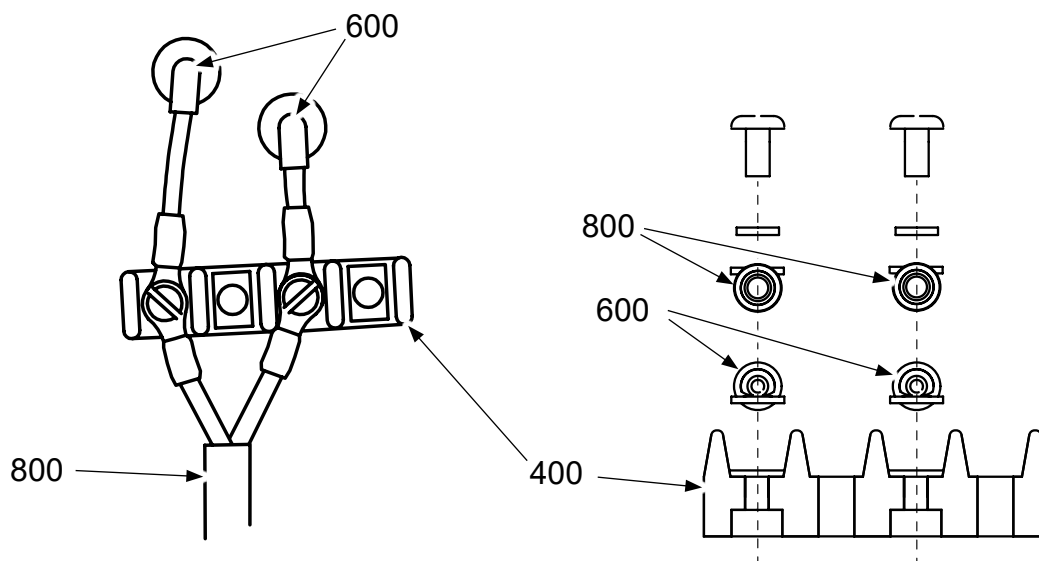
TPHMB-0088

**Wire Harness-to-Bracket  
Figure EI-8**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**108052**



**NOTE:** The illustrations show slip ring wires on a typical right-hand (rotation) propeller.

**Terminal Strip Lead Wire Configurations: Bulkhead Mounted  
Figure EI-9**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**108052**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>108052</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11EI</b> <b>FIGURES: EI-1 thru EI-9</b>		
100	B-6637-34	• SCREW, PAN HEAD, CRES	8	Y
200	B-3854-41	• WASHER, LOCK	16	Y
300	2H1365	• TAPPED EYELET	8	Y
400	1H1150-3	• TERMINAL STRIP, E.P.D. SYSTEM	4	
500	A-2070-6	• SCREW, 1/4-28, BUTTON HEAD	8	Y
600	108051	• SLIP RING ASSEMBLY	1	
700	B-3842-0437	• SPRING PIN, 3/32", CRES	4	Y
800	107019	• WIRE HARNESS	4	Y
900	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	4	Y
910	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	4	Y
920	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	4	Y
930	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	8	Y
1000	B-3853-F5	• CLAMP, LOOP, PLASTIC	4	Y
1100	B-3840-7	• SCREW, 10-32, FILLISTER HEAD	4	Y
1200	B-3837-0332	• WASHER, CORROSION RESISTANT	8	Y
1300	B-6265	• BRACKET, WIRE HARNESS	4	
1400	B-3834-0663	• WASHER	8	Y
1500	102691	• BOLT, 3/8-24, HEX HEAD	4	

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 108052**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**108584**

**EJ. Installation Instruction 11EJ**

- (1) Using the bolts (100), Belleville spring washers (200), washers (300), and nuts (400), attach the slip ring (500) to the spinner bulkhead and the spinner mounting plate as shown in Figure EJ-1.
  - (a) Torque the bolts (100) to 40-120 In-Lbs. (4.51-13.55 N•m).
  - (b) Perform a slip ring run-out check in accordance with the Check chapter in this manual.
- (2) Put the propeller blades at reverse blade angle.
- (3) Position the terminal block (600) on the counterweight/slug in accordance with Figure EJ-2, then attach the terminal block to the counterweight/slug using screws (700) and washers (800).
  - (a) Torque the screws (700) to 10-12 In-Lbs. (1.2-1.3 N•m).
- (4) Attach the "equal length leads" from the wire harness (900) and the de-ice boot lead wires to the terminal block (600) on the counterweight/slug in accordance with Figure EJ-2.
  - (a) Tighten the screws on the terminal block (600) until snug.
- (5) Using tie strap (1000), attach the de-ice boot lead wires to the blade clamp as shown in Figure EJ-3.
  - (a) Position the head of the tie strap (1000) as shown in Figure EJ-3.
- (6) Install the loop clamp (1100) around the wire harness (900) and attach to the counterweight/slug using the screw (1200) and washer (1300) in accordance with Figure EJ-3.
  - (a) Position the loop clamp (1100) as shown in Figure EJ-3.
  - (b) Torque the screw (1200) to 22-25 In-Lbs. (2.4-2.8 N•m) .
- (7) Position the terminal block (600) on the bulkhead in accordance with Figure EJ-4, then attach the terminal block to the bulkhead using screws (1400) and washers (800).
  - (a) Torque the screws (1400) to 10-12 In-Lbs. (1.2-1.3 N•m).
- (8) Attach the leads from the slip ring (500) and the wire harness (900) to the terminal block (600) on the bulkhead in accordance with Figure EJ-4.
  - (a) Tighten the screws on the terminal block (600) until snug.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

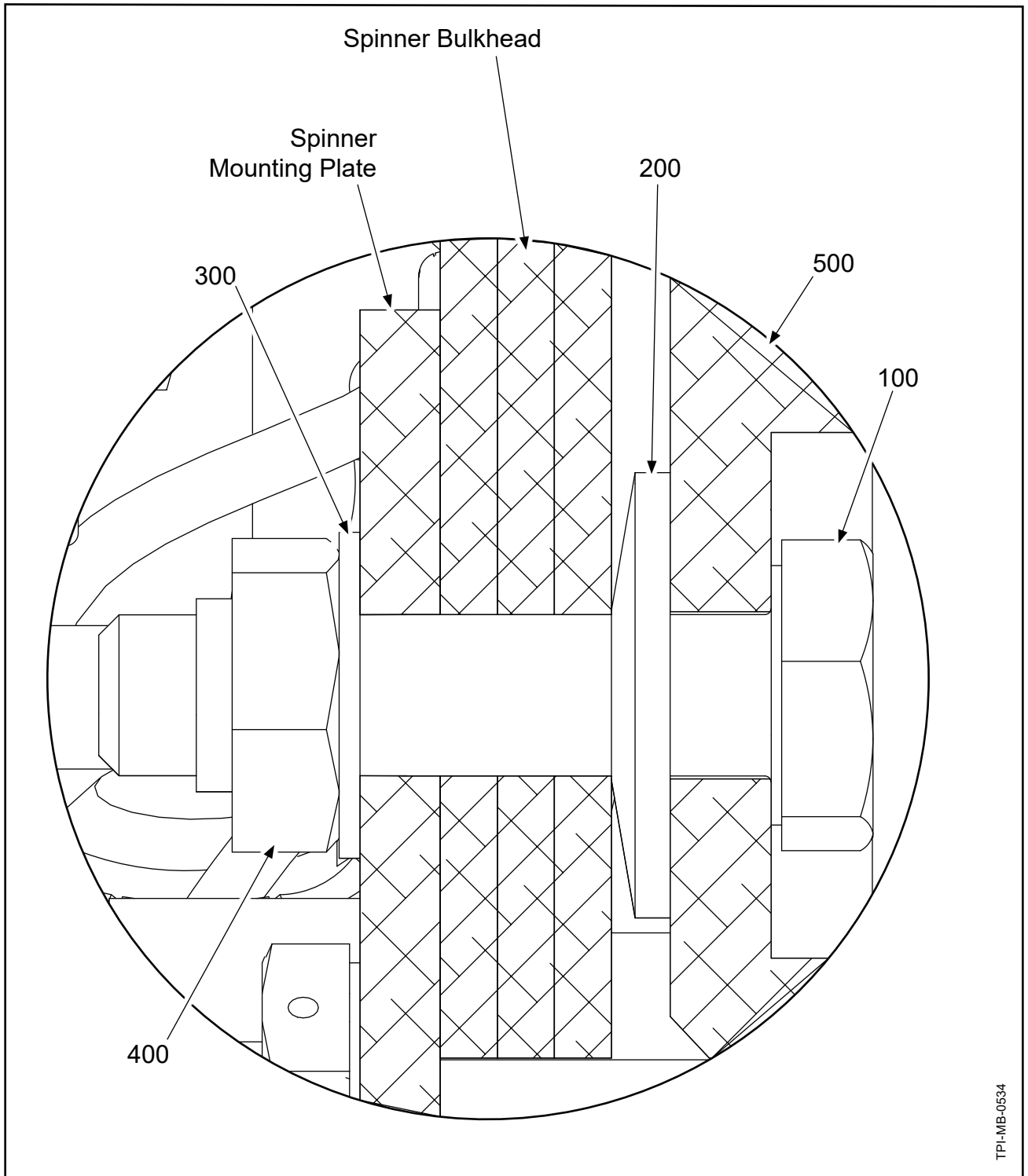
**108584**

EJ. Installation Instruction 11EJ - continued

- (9) Install the loop clamp (1100) around the wire harness (900) and attach to the bulkhead using the screw (1500), washers (1600), and nut (1700) in accordance with Figure EJ-4.
  - (a) Position the centerline of the loop clamp (1100) as shown in Figure EJ-4.
  - (b) Torque the screw (1500) to 22-25 In-Lbs. (2.5-2.8 N•m).
- (10) Cycle the propeller from reverse angle to feather angle to verify proper installation of the wire harness (900).
  - (a) Make sure the wire harness is not obstructed during cycling.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

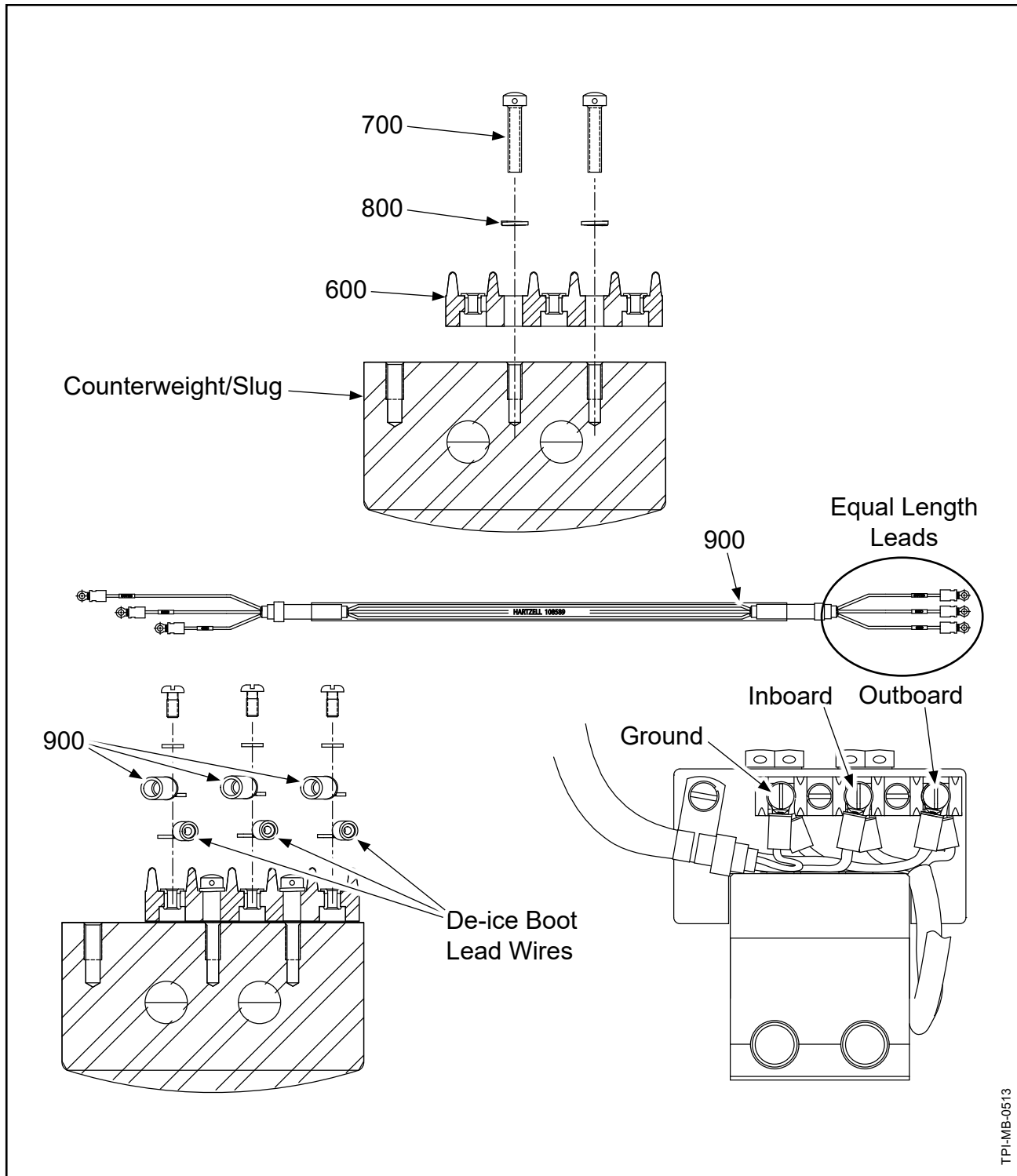
This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**108584**



**Slip Ring Mounting  
Figure EJ-1**

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**108584**

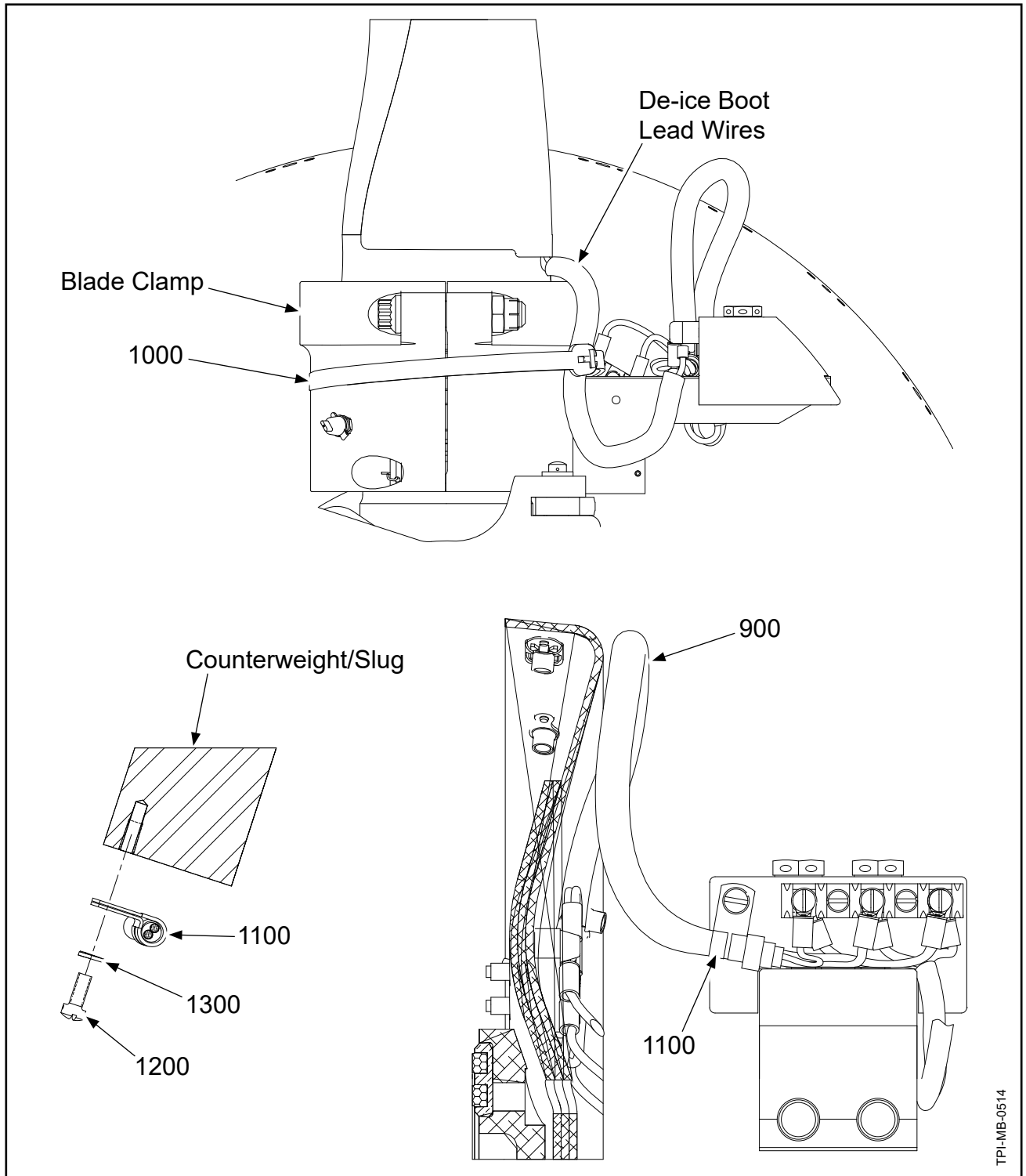


**Terminal Strip Installation: Counterweight Mounted**  
**Figure EJ-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

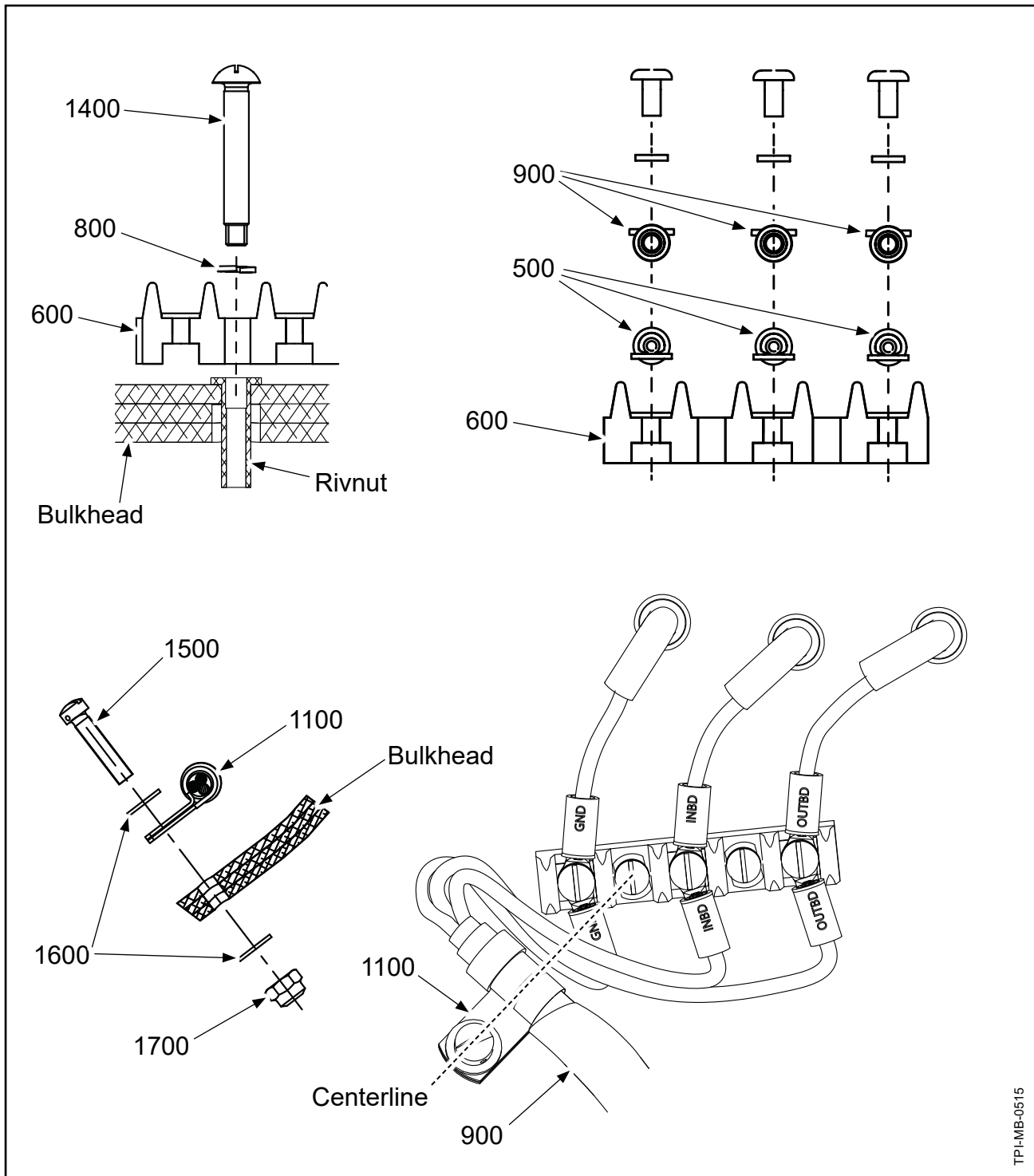
**108584**



**Securing the Lead Wires  
Figure EJ-3**

# **HARTZELL ICE PROTECTION SYSTEM MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**108584**



**Terminal Strip Installation: Counterweight Mounted  
Figure EJ-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**108584**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>108584</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11EJ</b> <b>FIGURES: EJ-1 thru EJ-4</b>		
100	B-3874-10A	• BOLT, 1/4-28, HEX HEAD	10	Y
200	B-7077-52	• BELLEVILLE SPRING WASHER	10	Y
300	B-3837-0432	• WASHER, CORROSION RESISTANT	10	Y
400	B-3808-4	• NUT, HEX, SELF-LOCKING	10	Y
500	4H3060-1	• SLIP RING ASSEMBLY	1	
600	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM	10	
700	B-6631-231	• SCREW, 6-32, FILLISTER HEAD, CRES	10	Y
800	B-3854-41	• WASHER, LOCK	20	Y
900	108589	• WIRE HARNESS	5	Y
1000	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	5	Y
1100	B-6735	• CLAMP, LOOP, CUSHIONED	10	Y
1200	B-3856-243	• SCREW, 8-32, FILLISTER HEAD, CRES	5	Y
1300	B-3854-42	• WASHER, LOCK	5	Y
1400	B-6631-233	• SCREW, 6-32, FILLISTER HEAD, CRES	10	Y
1500	B-3856-247	• SCREW, 8-32, FILISTER HEAD, CRES	5	Y
1600	B-3837-N832	• WASHER, CORROSION RESISTANT	10	Y
1700	B-6655-08	• NUT, HEX, SELF-LOCKING	5	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 108584**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**108584**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**108607**

**EK. Installation Instruction 11EK**

- (1) Using the screw (100), washers (200), tapped eyelet (300), attach the terminal strip (400) to the bulkhead in accordance with Figure EK-1.
  - (a) Torque the screw (100) to 10-12 In-Lb (1.2-1.3 N•m).
- (2) Using the screws (500), attach the slip ring (600) and the bulkhead to the hub as shown in Figure EK-2.
  - (a) Torque each screw (500) 8-10 Ft-Lb (10.9-13.5 N•m).
  - (b) Complete a slip ring run-out check in accordance with the Check chapter of this manual.
- (2) Put the propeller blades at reverse blade angle.
- (3) Press the spring pin (700) perpendicularly into the hole in the counterweight as shown in Figure EK-3.
  - (a) The spring pin (700) must extend to a height of 0.170-0.210 inch (4.32-5.33 mm).
- (4) Assemble the plug connection between the wire harness (800) and the de-ice boot.
- (5) Install the wire harness/de-ice boot plug connections in the groove in the counterweight against the spring pin (700) as shown in Figure EK-4.
- (6) Install the tie strap (900) in the retaining grooves of the counterweight and around the counterweight and between the wires of the wire harness/de-ice boot plug connection as shown in Figure EK-4.

**CAUTION:**     ROUTING THE TIE STRAP (900) INCORRECTLY CAN  
                         CAUSE AN ELECTRICAL SHORT IN THE DE-ICE SYSTEM.

- (a) On the boot-side of the plug connection: install the tie strap (900) between wire 1 and wire 2 as shown in Figure EK-4.
  - (b) On the wire harness-side of the plug connection: install the tie strap (900) between wire 2 and wire 3 as shown in Figure EK-4.
  - (c) Position the head of tie strap (900) in approximate location shown in Figure EK-4.
- (7) Using the tie strap (910), secure the de-ice boot lead wires to the tie strap (900) as shown in Figure EK-4.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**108607**

**EK. Installation Instruction 11EK - continued**

- (8) Install the tie strap (920) around the blade shank and over the de-ice boot lead wires as shown in Figure EK-5.
  - (a) The head of tie strap (920) must be located in line with the balance weight hole when the propeller is in feather position as shown in Figure EK-5.
- (9) Install the clamp (1000), around the wire harness (800) and position it against the O-ring as shown in Figure EK-6.
- (10) Apply threadlocker CM399 to the threads of the screw (1100).
- (11) Using screw (1100) and washers (1200), install the clamp (1000) to the counterweight in accordance with Figure EK-6.
  - (a) Align the centerline of the clamp (1000) so that it is parallel to the hub surface as shown in Figure EK-6.
  - (b) Torque the screw (1100) to 20-22 In-Lb (2.3-2.4 N•m).
- (12) Using the bolt (1500), washer (1400), and the existing hub clamping washer and nut, attach the wire harness bracket (1300) to the hub in accordance with Figure EK-7.
  - (a) Position the wire harness bracket (1300) with the centerline directed toward the inboard ("INBD") slip ring lead wire as shown in Figure EK-8.
  - (b) Torque the hub clamping nut to 20-22 Ft-Lb (28-29 N•m).
- (13) Put the wire harness (800) on the wire harness bracket (1300) with the O-ring off of the edge of the bracket as shown in Figure EK-8.

**CAUTION:    TWISTING OF THE LEAD WIRES BETWEEN THE  
CLAMP (1000) AND THE WIRE HARNESS BRACKET (1300)  
IS NOT PERMITTED.**

- (a) Attach the wire harness (800) to the wire harness bracket (1300) with two tie straps (1600) as shown in Figure EK-8.
- (14) Route the wire harness (800) under the inboard ("INBD") and ground ("GND") slip ring lead wires and over the outboard ("OUTBD") slip ring lead wire as shown in Figure EK-8.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**108607**

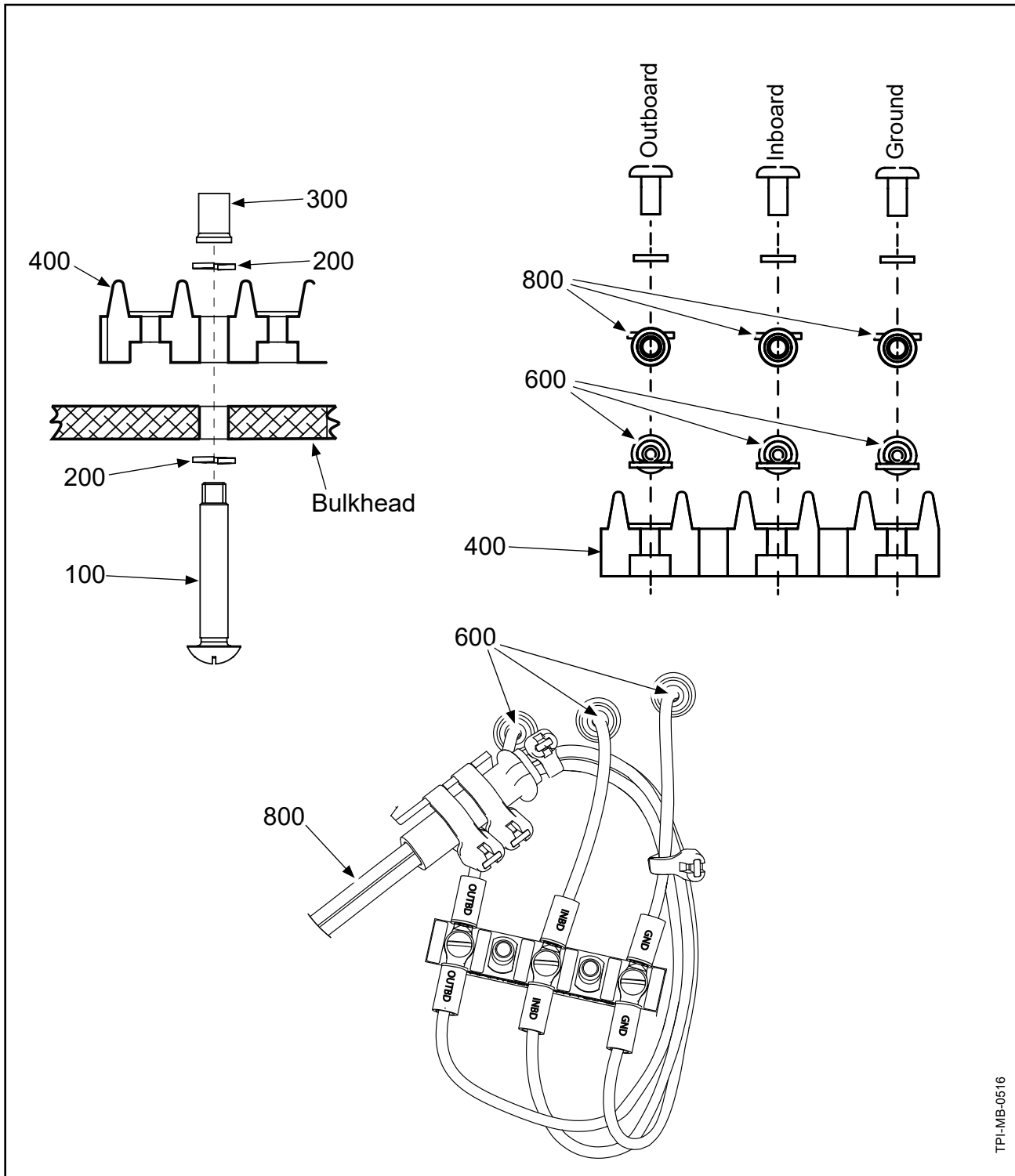
**EK.**    Installation Instruction 11EK - continued

- (15) Attach the lead wires from the slip ring (600) and the lead wires from the wire harness (800) to the terminal strip (400) in accordance with Figure EK-1 and Figure EK-8.
  - (a) Using one tie strap (910), attach the lead wires from the wire harness (800) to the ground ("GND") slip ring lead wire as shown in Figure EK-8.
  - (b) Tighten the terminal strip screws until snug.
- (16) Cycle the propeller blades from reverse angle to feather angle to verify proper wire harness installation. Make sure the wire harness is not blocked during cycling.

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions for the following electric de-ice kit(s):

**108607**



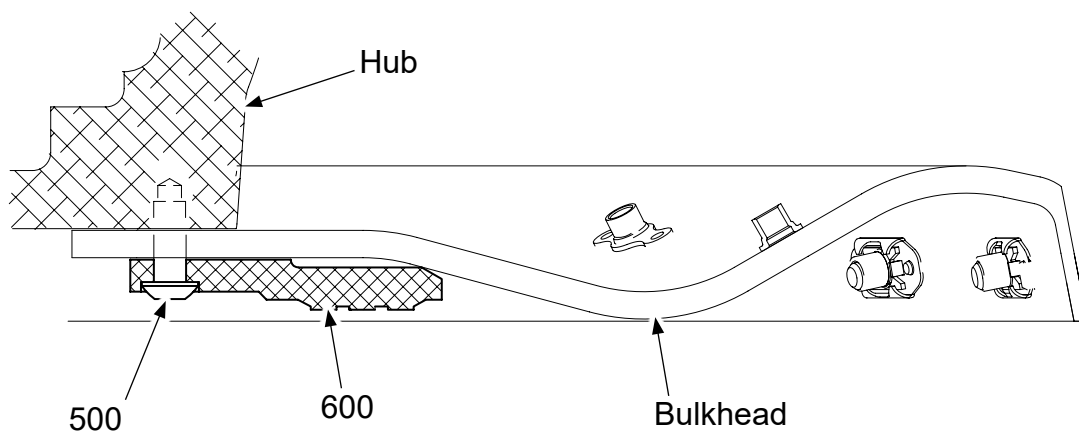
### Terminal Strip Hardware Installation: Bulkhead Mounted

**Figure EK-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**108607**

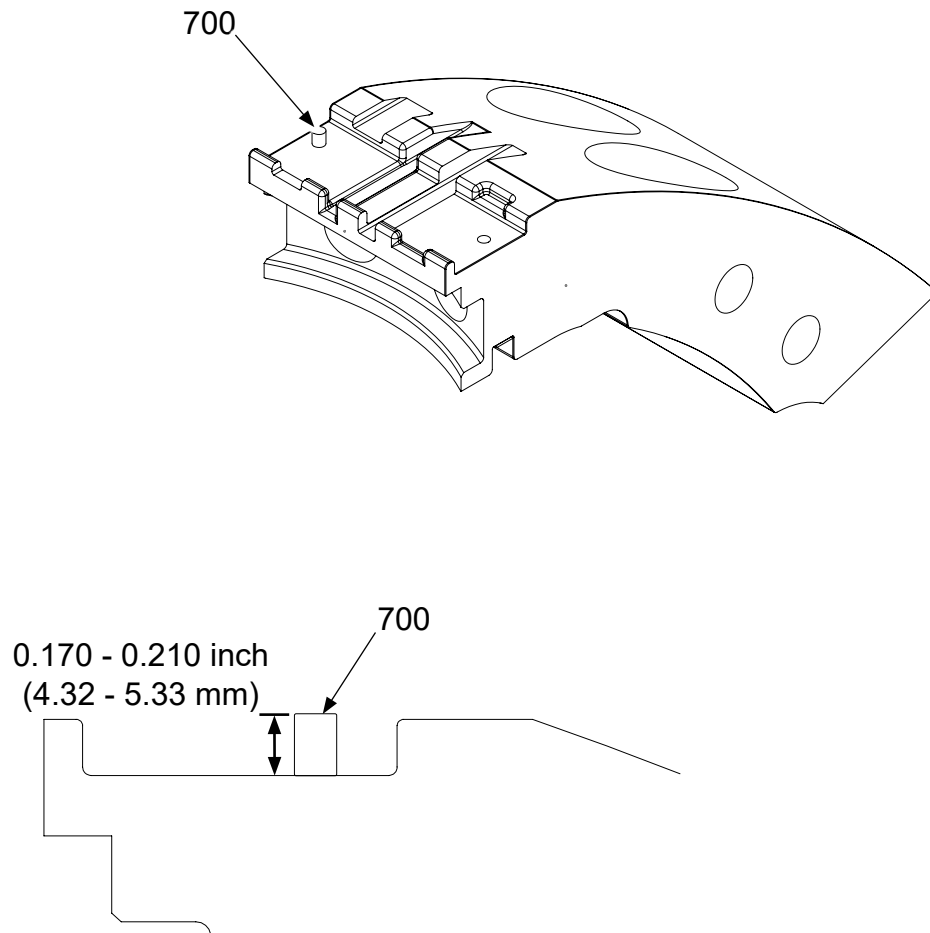


**Slip Ring Installation  
Figure EK-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**108607**



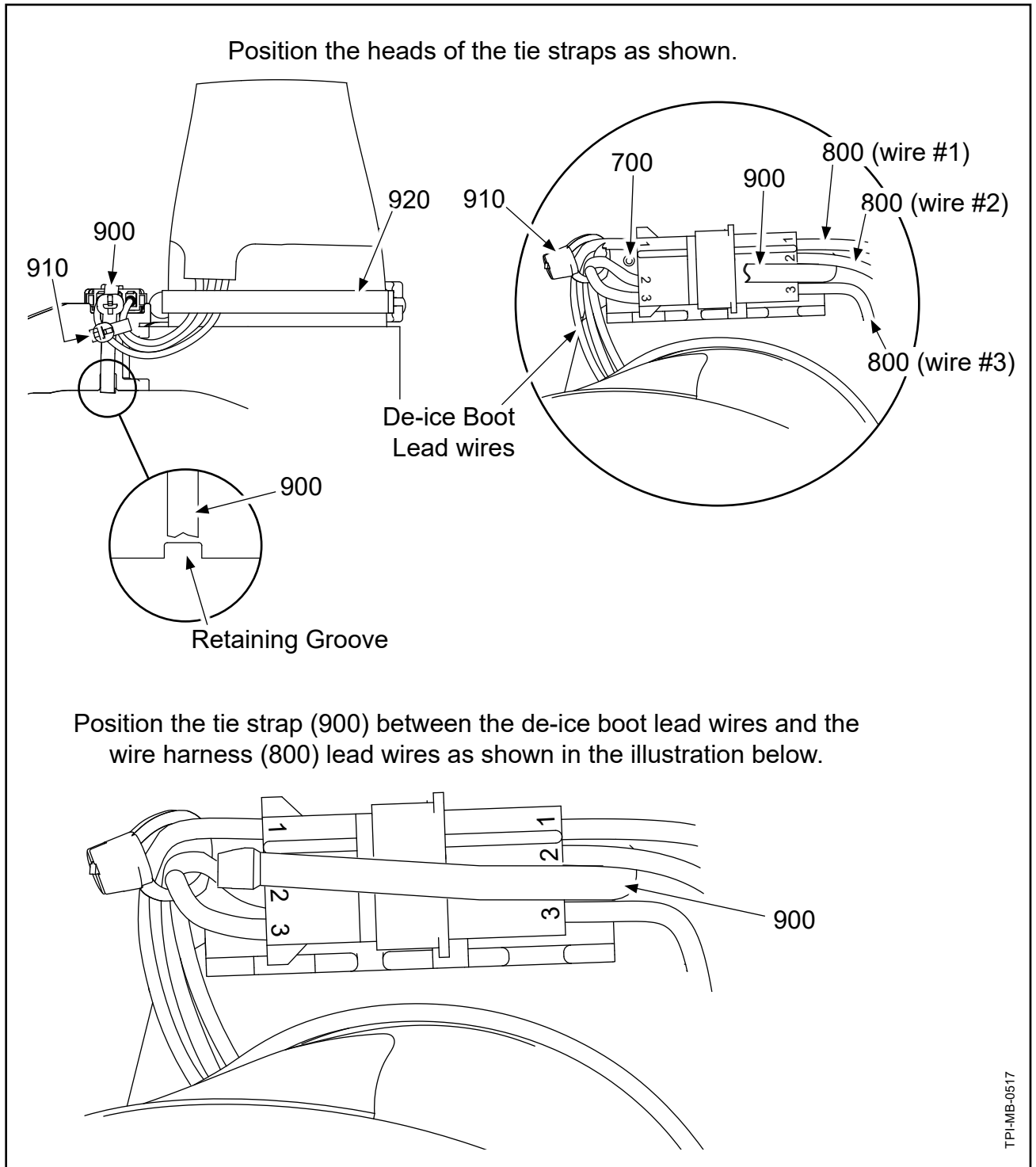
TPI-MB-0078

**Spring Pin Height  
Figure EK-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**108607**

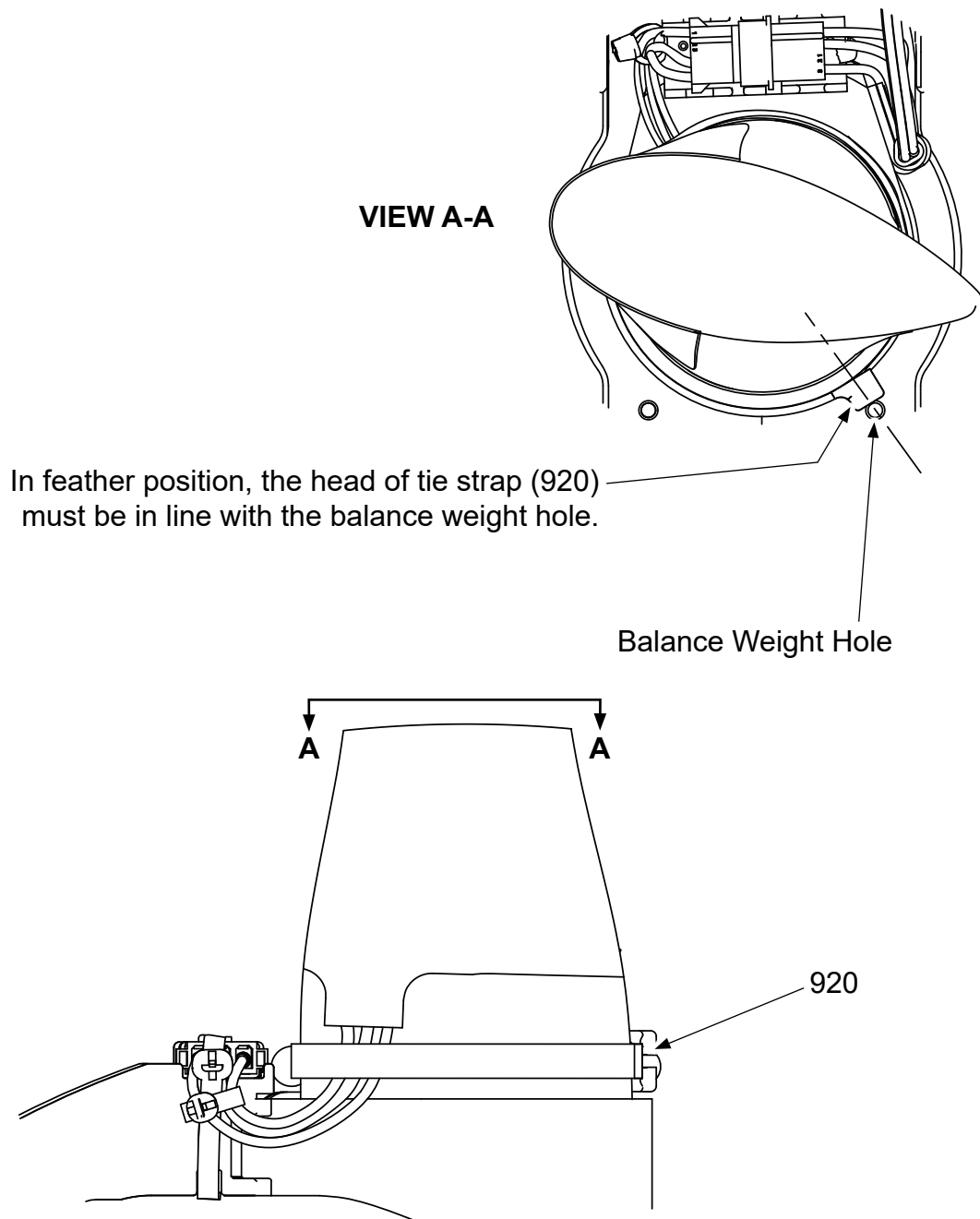


**Wire Harness to Blade Shank/Counterweight  
Figure EK-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**108607**



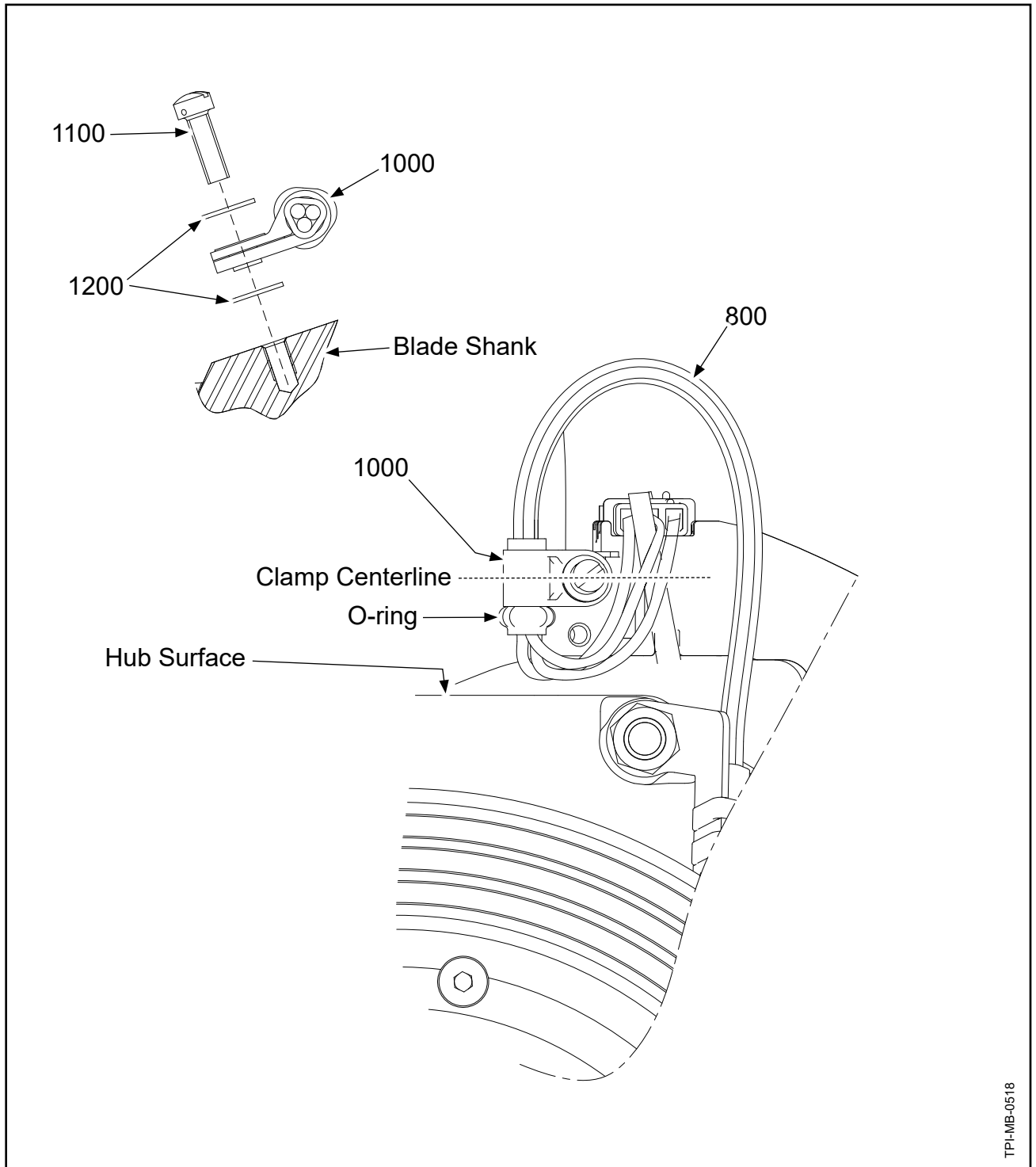
**Blade Shank Tie Strap Location  
Figure EK-5**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**108607**

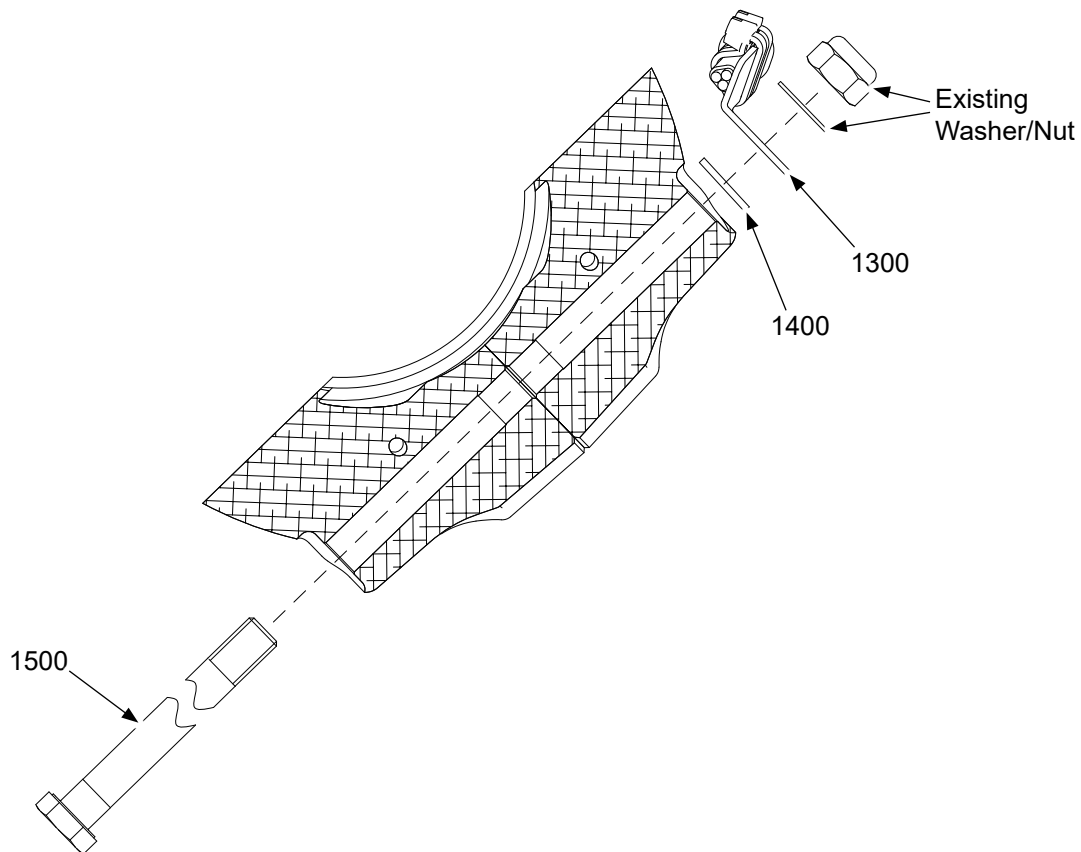


**Loop Clamp Orientation  
Figure EK-6**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**108607**

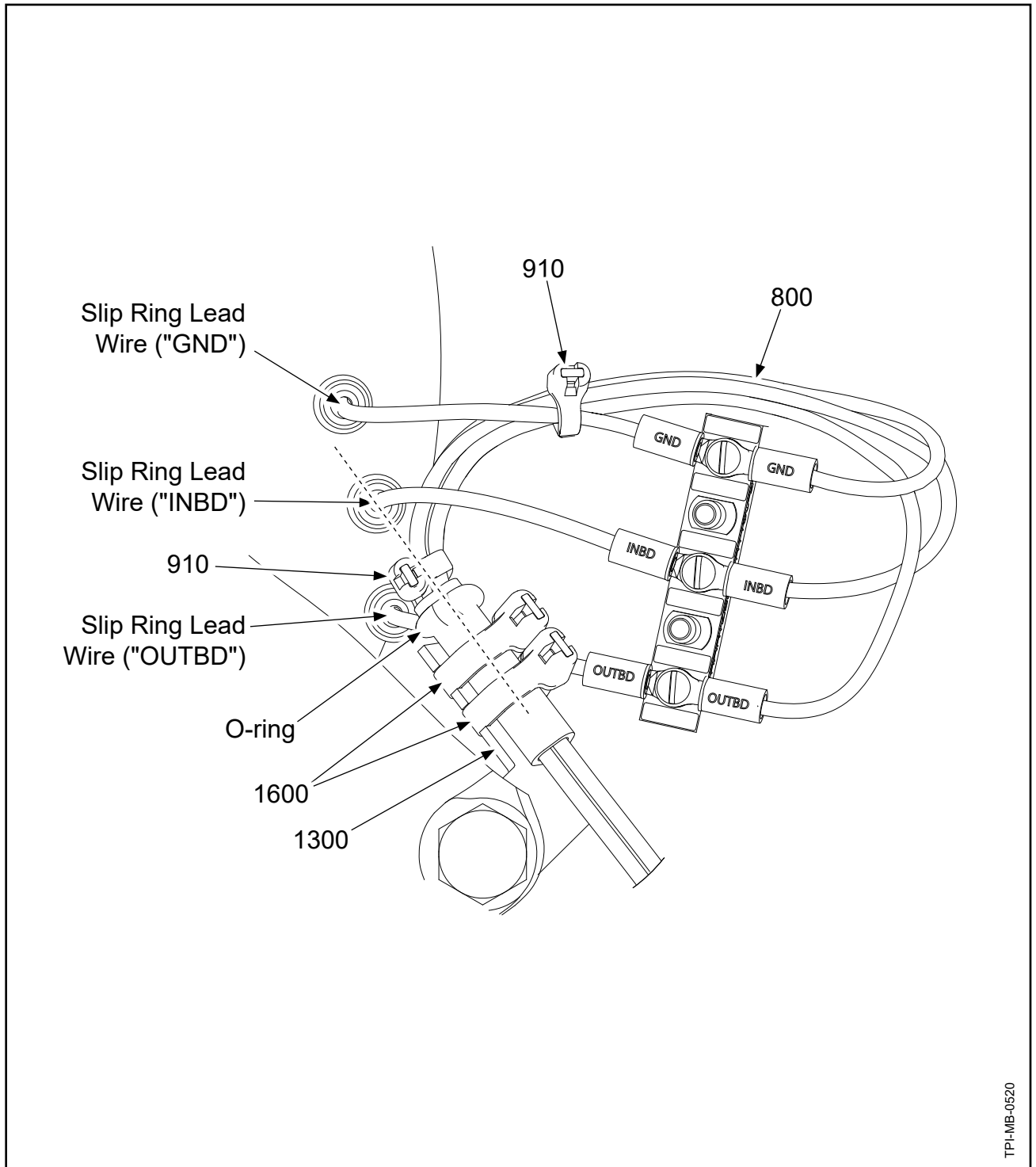


TPL-MB-0519

**Wire Harness Bracket Hardware Configuration  
Figure EK-7**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**108607**



**Wire Harness Bracket Alignment  
Figure EK-8**

TPLMB-0520

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**108607**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>108607</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11EK</b> <b>FIGURES: EK-1 thru EK-8</b>		
100	B-6637-34	• SCREW, PAN HEAD, CRES	10	Y
200	B-3854-41	• WASHER, LOCK	20	Y
300	2H1365	• TAPPED EYELET	10	Y
400	1H1150-2	• TERMINAL STRIP	5	
500	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	10	Y
600	108566	• SLIP RING ASSEMBLY	1	
700	B-3842-0437	• SPRING PIN, 3/32", CRES	5	Y
800	108612	• WIRE HARNESS	5	Y
900	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	5	Y
910	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	10	Y
920	B-3852-6-0	• STRAP, TIEDOWN, PLASTIC	5	Y
1000	B-3853-F5	• CLAMP, LOOP, PLASTIC	5	Y
1100	B-3840-7	• SCREW, 10-32, FILLISTER HEAD	5	Y
1200	B-3837-0332	• WASHER, CORROSION RESISTANT	10	Y
1300	105558L	• BRACKET, WIRE HARNESS	5	
1400	B-3834-0663	• WASHER	5	Y
1500	102691	• BOLT, 3/8-24, HEX HEAD	5	
1600	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	10	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 108607**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**109206**

**EL.    Installation Instruction 11EL**

- (1) Using the screws (100), attach the slip ring (200), and the bulkhead to the hub as shown in Figure EL-1.
  - (a) Torque each screw (100) to 8-10 Ft-Lbs (11-13 N•m).
  - (b) Perform a slip ring run-out check in accordance with the Check chapter in this manual.
- (2) Using screw (300), washers (400), and tapped eyelet (500), attach the terminal strip (600) to the bulkhead in accordance with Figure EL-2.
  - (a) Torque the screws (300) to 10-12 In-Lb (1.13-1.35 N•m).
- (3) Install the wire harness bracket (700).
  - (a) Install one washer (800), one washer (900), one wire harness bracket (700), the existing hub washer, and the existing hub clamping nut onto the hex head bolt (1000) in accordance with Figure EL-3.
  - (b) Position the wire harness bracket (700) so that the long edge of the bracket is parallel with the blade centerline as shown in Figure EL-4.
  - (c) Torque the hub clamping nut (dry) to 20-24 Ft-Lbs (27 - 33 N•m).
- (4) Position the propeller blades at low blade angle.
- (5) Assemble the plug connection between the wire harness (1100) and the de-ice boot.
  - (a) Install one tie strap (1200) around the wire harness/de-ice boot plug connection as shown in Figure EL-5. Do not tighten the tie strap.
    - 1    Position the head of tie strap (1200) in the approximate location shown in Figure EL-5.
- (6) Route the terminal ends of the wire harness (1100) through the hole in the counterweight as shown in Figure EL-5.
  - (a) Position the wire harness (1100) so that equal lengths of the clear tubing are on each side of the counterweight.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**109206**

EL. Installation Instruction 11EL - continued

- (7) Install the clamp (1300) around the wire harness (1100) with the O-ring positioned against the clamp as shown in Figure EL-5.
  - (a) Apply threadlocking adhesive CM399 to the threads of the screw (1400).
  - (b) Using the screw (1400), lockwasher (1500), two washers (1600), attach the clamp (1300) to the counterweight in accordance with Figure EL-6.
    - 1 Torque the screw (1400) to 22-25 In-Lbs.(2.5-2.8 N•m).
- (8) Secure the wire harness/de-ice boot plug connection to the counterweight.
  - (a) Install two tie straps (1700) under the tie strap (1200) that secures the plug connection, and around the counterweight/wire harness as shown in Figure EL-5. Do not tighten the tie straps.
    - 1 Position the heads of the two tie straps (1700) as shown in Figure EL-5.
  - (b) Install one tie strap (1700) under the counterweight and around the clear tubing on the wire harness (1100) as shown in Figure EL-5. Do not tighten the tie strap.
    - 1 Make sure the tie strap (1700) is over the clear tubing of the wire harness (1100) on both sides of the counterweight.
    - 2 Install one tie strap (1800) around the clear tubing on the wire harness (1100) and the tie strap (1700) on both sides of the counterweight as shown in Figure EL-5.
- (9) Make sure the wire harness/tie straps are positioned correctly, then tighten all of the tie straps in the following order:
  - (a) The tie strap (1200) securing the wire harness/de-ice boot plug connection
  - (b) The three tie straps (1700) around the wire harness/counterweight
  - (c) The two tie straps (1800) around the tie strap (1700)
- (10) Install one tie strap (1800) around the wire harness (1100) below the O-ring at the terminal-end of the harness (1100) as shown in Figure EL-7.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**109206**

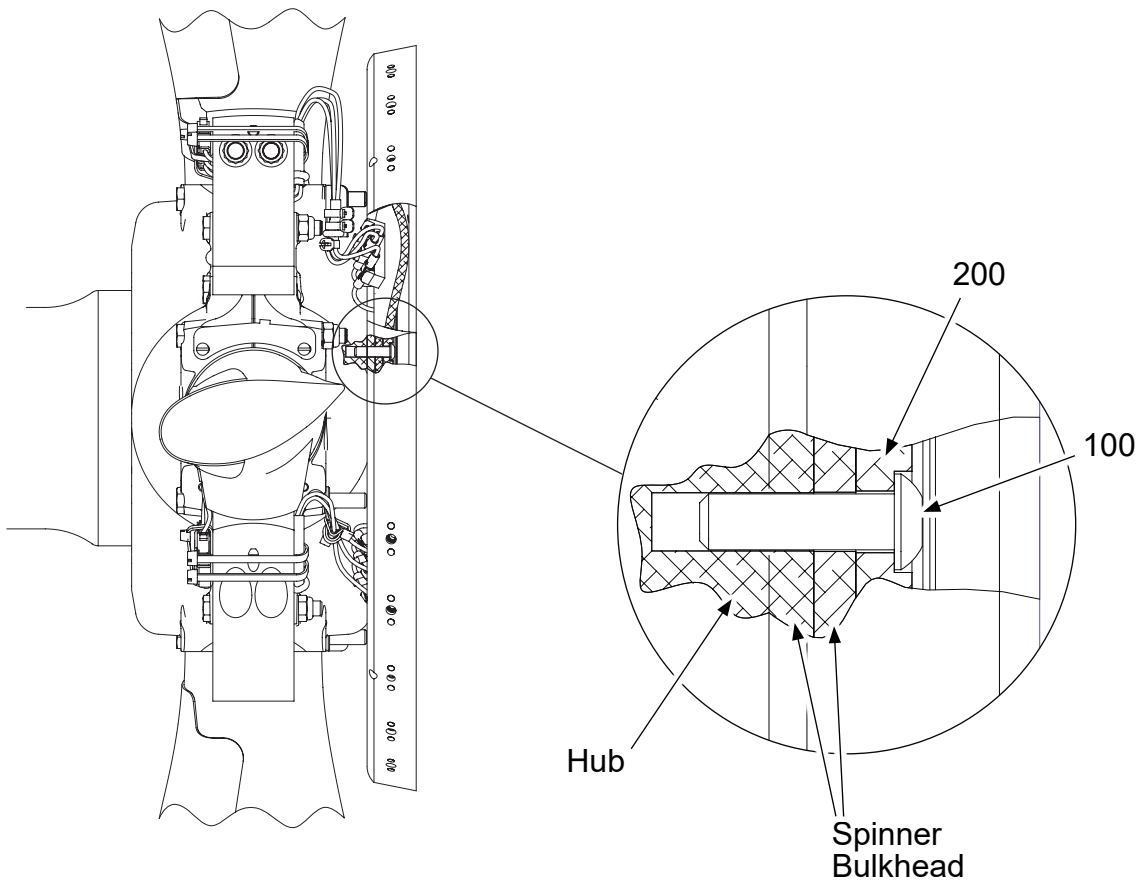
EL. Installation Instruction 11EL - continued

- (11) Secure the wire harness (1100) to the wire harness bracket (700).
  - (a) Position the O-ring/shrink tubing on the terminal end of the wire harness (1100) so that the O-ring is on top of the wire harness bracket (700) as shown in Figure EL-8.
    - 1 Make sure the lead wires are not twisted or bent sharply.
  - (b) Install and tighten two tie straps (1700) around the bracket and the shrink tubing on the wire harness (1100) as shown in Figure EL-8.
    - 1 Position the tie straps (1700) in the grooves on the wire harness bracket (700).
    - 2 Position the heads of the tie straps (1700) as shown in Figure EL-8.
- (12) Install the lead wires from the slip ring (200) and the lead wires from the wire harness (1100) to the terminal strip (600) in accordance with Figure EL-2.
  - (a) Position the ring terminals as shown in Figure EL-2.
  - (b) Install the terminal screws and washers as shown in Figure EL-2.
  - (c) Tighten the terminal screws until snug.
- (13) Cycle the propeller from low angle to feather angle to verify correct wire harness installation. Make sure the wire harness is not blocked during cycling.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**109206**



TPI-MB-0074

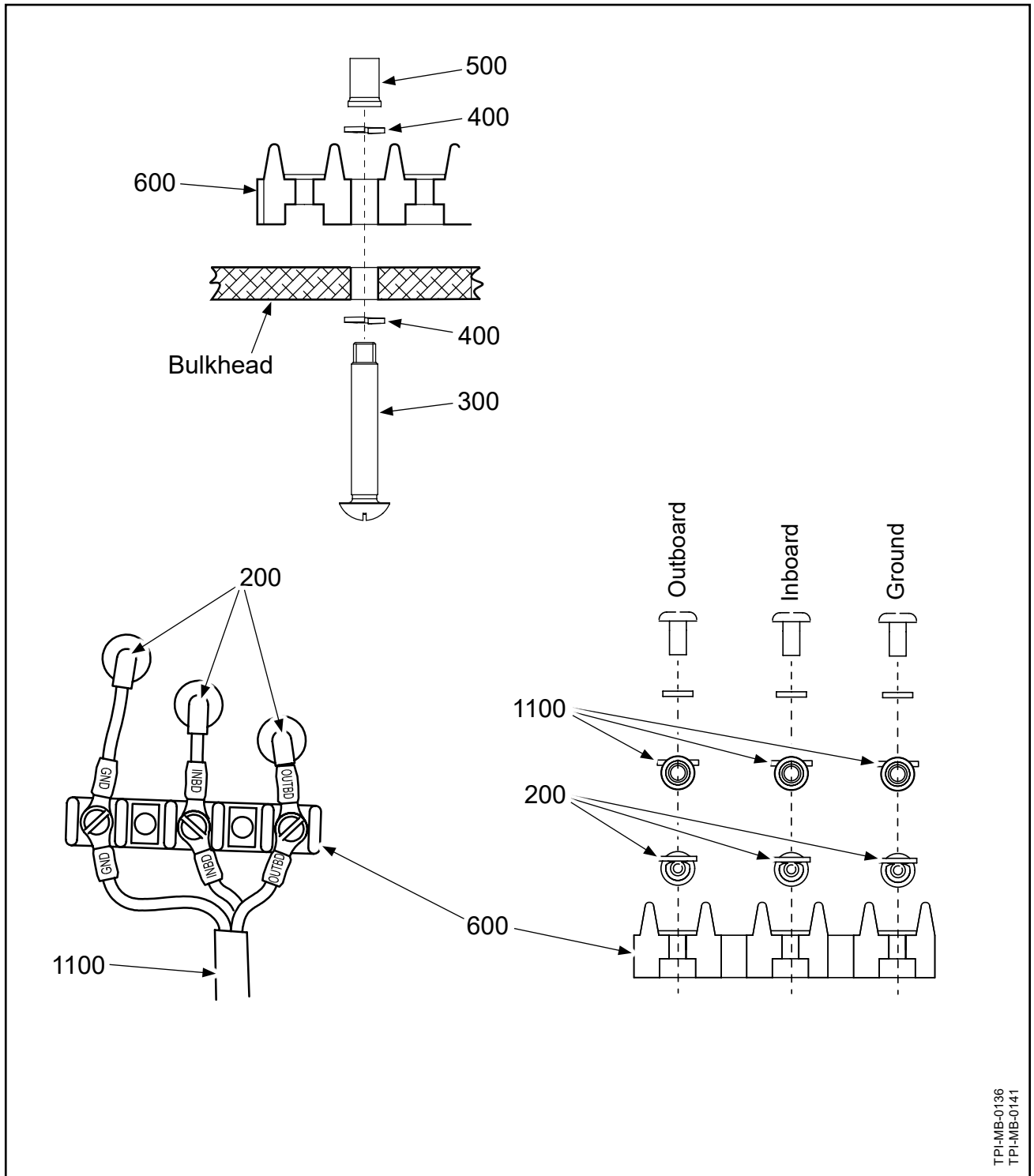
**Slip Ring Mounting  
Figure EL-1**



# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions for the following electric de-ice kit(s):

**109206**

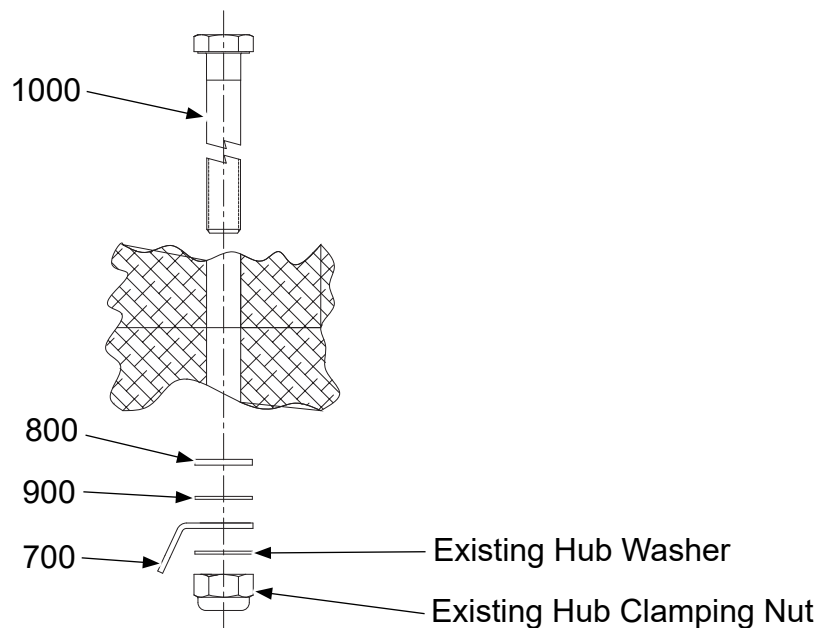


**Terminal Strip Hardware Configuration: Bulkhead Mounted**  
**Figure EL-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**109206**



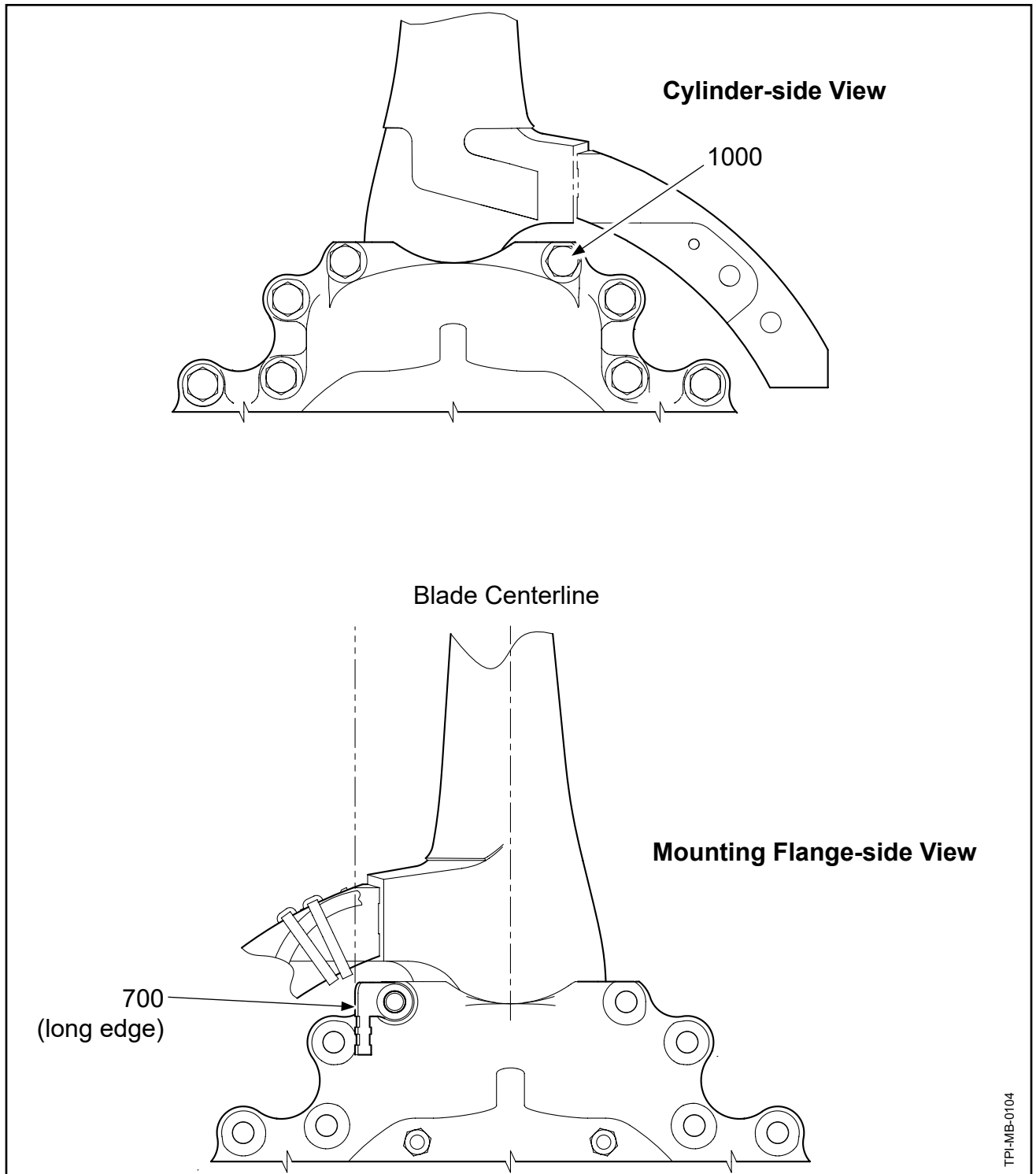
TPH-MB-0087-

**Wire Harness Bracket Hardware Configuration  
Figure EL-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**109206**

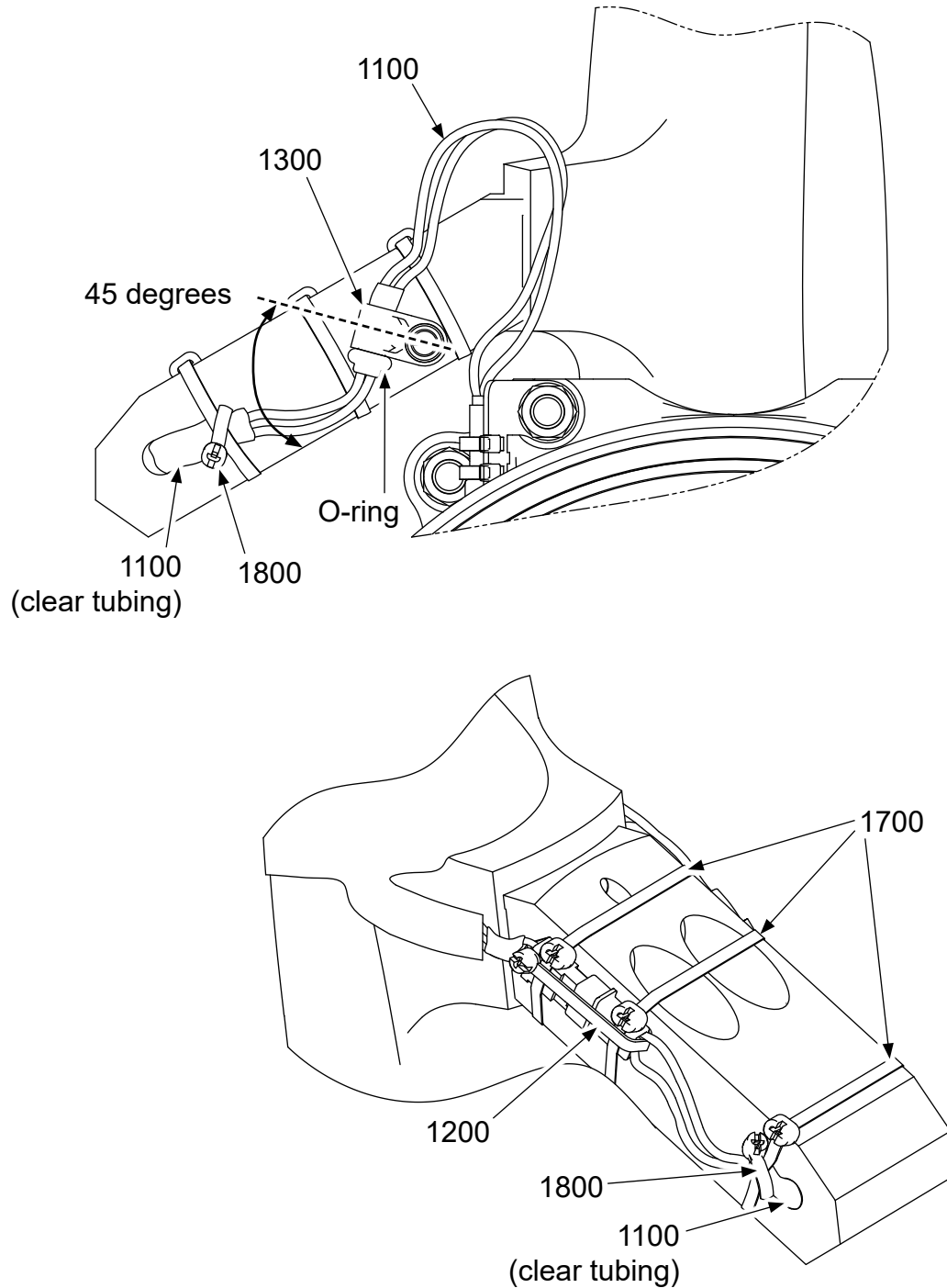


**Hub Clamping Bolt Replacement and De-ice Bracket Alignment  
Figure EL-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**109206**



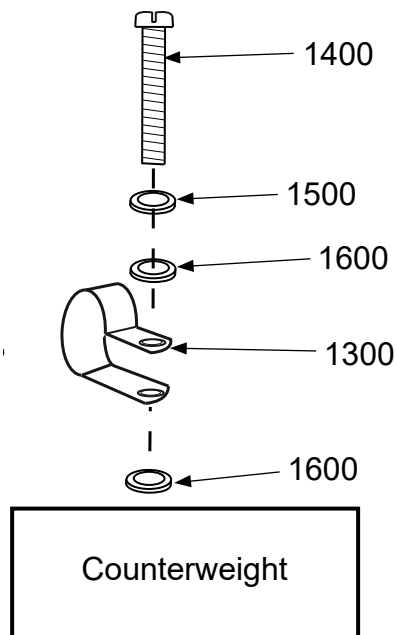
TPI-MB-0173

**Wire Harness-to-Counterweight  
Figure EL-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**109206**



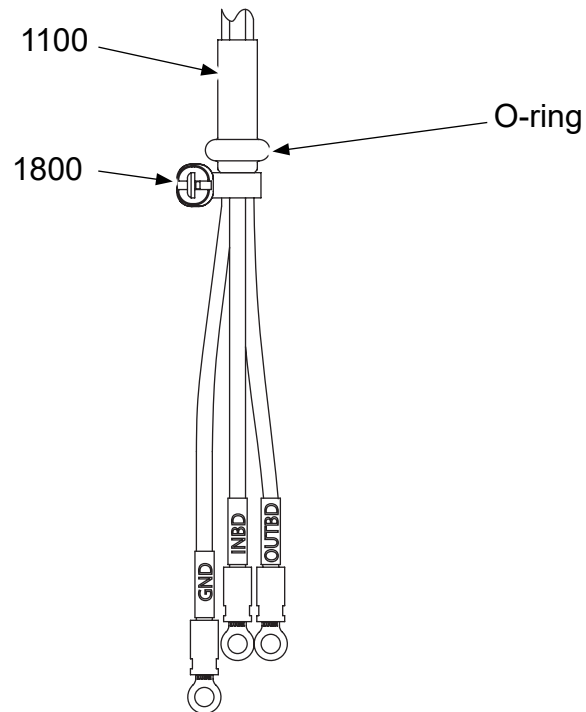
TI-00180ACC  
TI-00180BCC

**Loop Clamp to Counterweight Hardware Configurations  
Figure EL-6**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**109206**



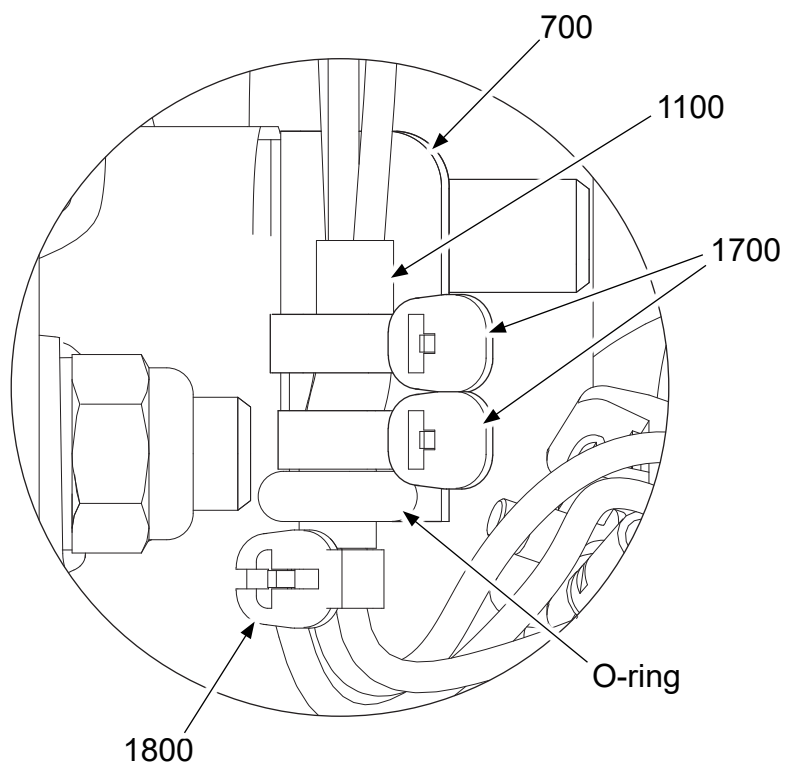
TPI-MB-0130

**Wire Harness Tie Strap Location  
Figure EL-7**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**109206**



**Wire Harness to De-ice Bracket  
Figure EL-8**

TPL-MB-0088

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**109206**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>109206</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11EL</b> <b>FIGURES: EL-1 thru EL-8</b>		
100	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	8	Y
200	106861	• SLIP RING ASSEMBLY	1	
300	B-6637-34	• SCREW, PAN HEAD, CRES	8	Y
400	B-3854-41	• WASHER, LOCK	16	Y
500	2H1365	• TAPPED EYELET	8	Y
600	1H1150-2	• TERMINAL STRIP	4	
700	B-6265	• BRACKET, WIRE HARNESS	4	
800	B-3834-0663	• WASHER	4	Y
900	B-3834-0632	• WASHER	4	Y
1000	102691	• BOLT, 3/8-24, HEX HEAD	4	
1100	109199	• WIRE HARNESS	4	Y
1200	B-3852-1-0	• STRAP, TIEDOWN, PLASTIC	8	Y
1300	B-3853-F5	• CLAMP, LOOP, PLASTIC	4	Y
1400	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
1500	B-3854-42	• WASHER, LOCK	4	Y
1600	B-3837-N832	• WASHER, CORROSION RESISTANT	8	
1700	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	20	Y
1800	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	8	Y

- ITEM NOT ILLUSTRATED

**De-ice Kit(s): 109206**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**5E2702-1ALT, 5E2729-1ALT, 67-870-1ALT, and 67-932-1ALT**

**EM. Installation Instruction 11EM**

- (1) Using the screws (1170), attach the slip ring (1140) and the bulkhead to the hub as shown in Figure EM-1.
  - (a) Torque each screw (1170) 96-120 In-Lbs (10.1-13.5 N•m).
  - (b) Perform slip ring run-out check in accordance with the Check chapter in this manual.
- (2) Position the propeller blades at reverse blade angle.
- (3) Assemble the plug connection between the wire harness (890) and the de-ice boot.
- (4) Install the tie strap (930) around the wire harness/de-ice boot plug connection.
- (5) Position the tie strap head (930) in approximate location shown in Figure EM-2.
- (6) Route the terminal end of the wire harness (890) through the hole in counterweight rib, as shown in Figure EM-2.
- (7) Secure the wire harness/boot connection to the counterweight.
  - (a) Install tie straps (910) under the tie strap (930) connecting the wire harness/boot plugs, and around the counterweight as shown in Figure EM-2.
  - (b) Position the tie strap heads in the approximate location on the side of the counterweight as shown in Figure EM-2.
    - 1 Do not tighten the tie straps (910) at this time.
- (8) Verify that the wire harness (890) is taut through the counterweight hole.
- (9) Secure the wire harness (890) to the counterweight by installing the tie strap (930) through the counterweight hole and over the wire harness (890) on both sides of the counterweight as shown in Figure EM-2.
- (10) Tighten all of the tie straps (910 and 930).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**5E2702-1ALT, 5E2729-1ALT, 67-870-1ALT, and 67-932-1ALT**

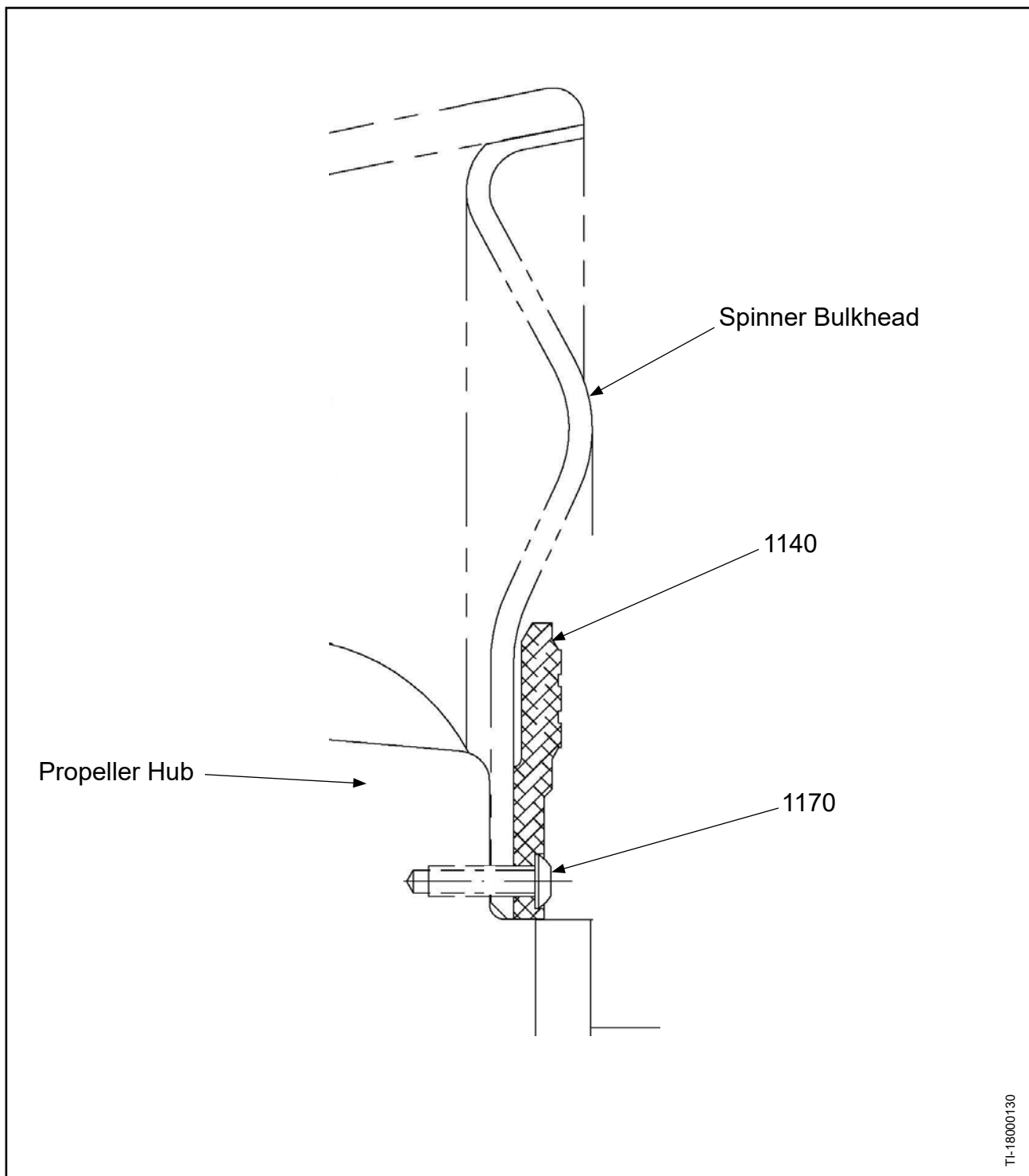
**EM. Installation Instruction 11EM - continued**

- (11) Using the screw (220), washers (200 and/or 210), and tapped eyelet (190), attach the terminal strip (170) to the bulkhead in accordance with Figure EM-3 and Figure EM-4.
- (12) Torque the screw (220) to 10-12 In-Lbs (1.1-1.3 N•m).
- (13) Install the slip ring lead wires and de-ice wire harness (890) to the terminal strip (170) in accordance with the the configuration specified below:
  - (a) 7931-5E2702-1: Typical 3-wire Configuration (Refer to Figure EM-5)
  - (b) 7931-5E2729-1: Typical 3-wire Configuration (Refer to Figure EM-5)
  - (c) 7931-67-870-1: Crossfire Configuration B (Refer to Figure EM-6)
  - (d) 7931-67-932-1: Typical 3-wire Configuration (Refer to Figure EM-5)
- (14) Tighten the terminal screws until snug.
- (15) Install the clamp (590), around the wire harness (890).
- (16) Using the screw (610), washers (620 and/or 630) nut (600), install the clamp (590) to the bulkhead in accordance with Figure EM-7, Figure EM-4, and Figure EM-8.
  - (a) Orient the centerline of the clamp (590) parallel to terminal strip (170).
- (17) Torque the screw (610) to 22-25 In-Lbs (2.48-2.82 N•m).

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**5E2702-1ALT, 5E2729-1ALT, 67-870-1ALT, and 67-932-1ALT**



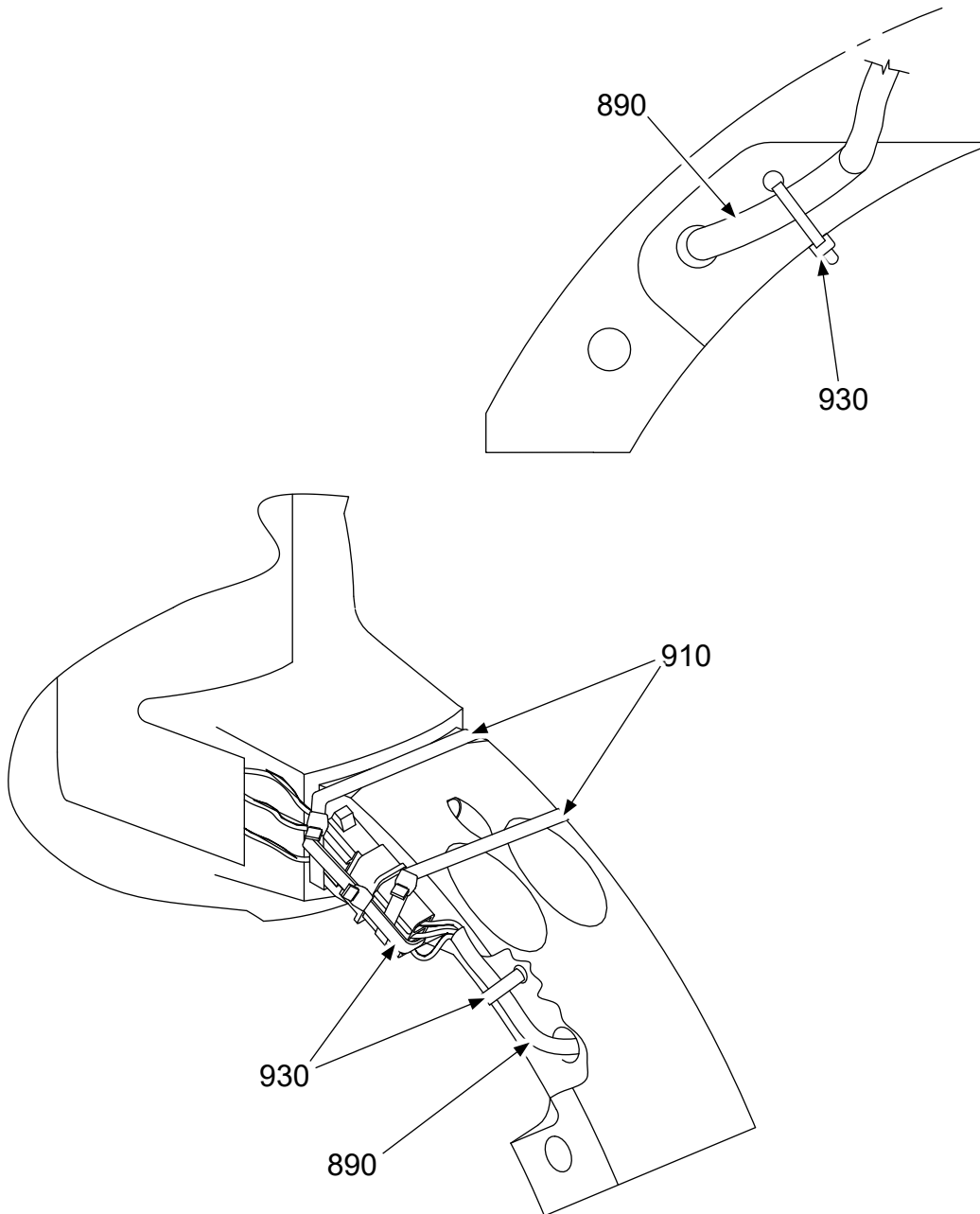
**Slip Ring Mounting  
Figure EM-1**

TI-18000130

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**5E2702-1ALT, 5E2729-1ALT, 67-870-1ALT, and 67-932-1ALT**

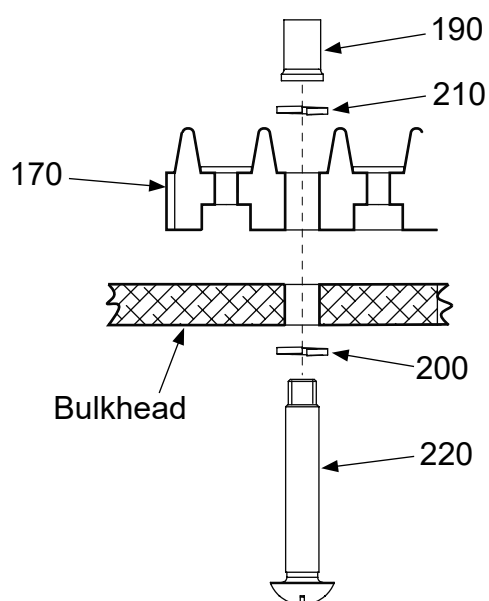


TPI-MB-0614

**Wire Harness to Counterweight  
Figure EM-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**5E2702-1ALT, 5E2729-1ALT, 67-870-1ALT, and 67-932-1ALT**

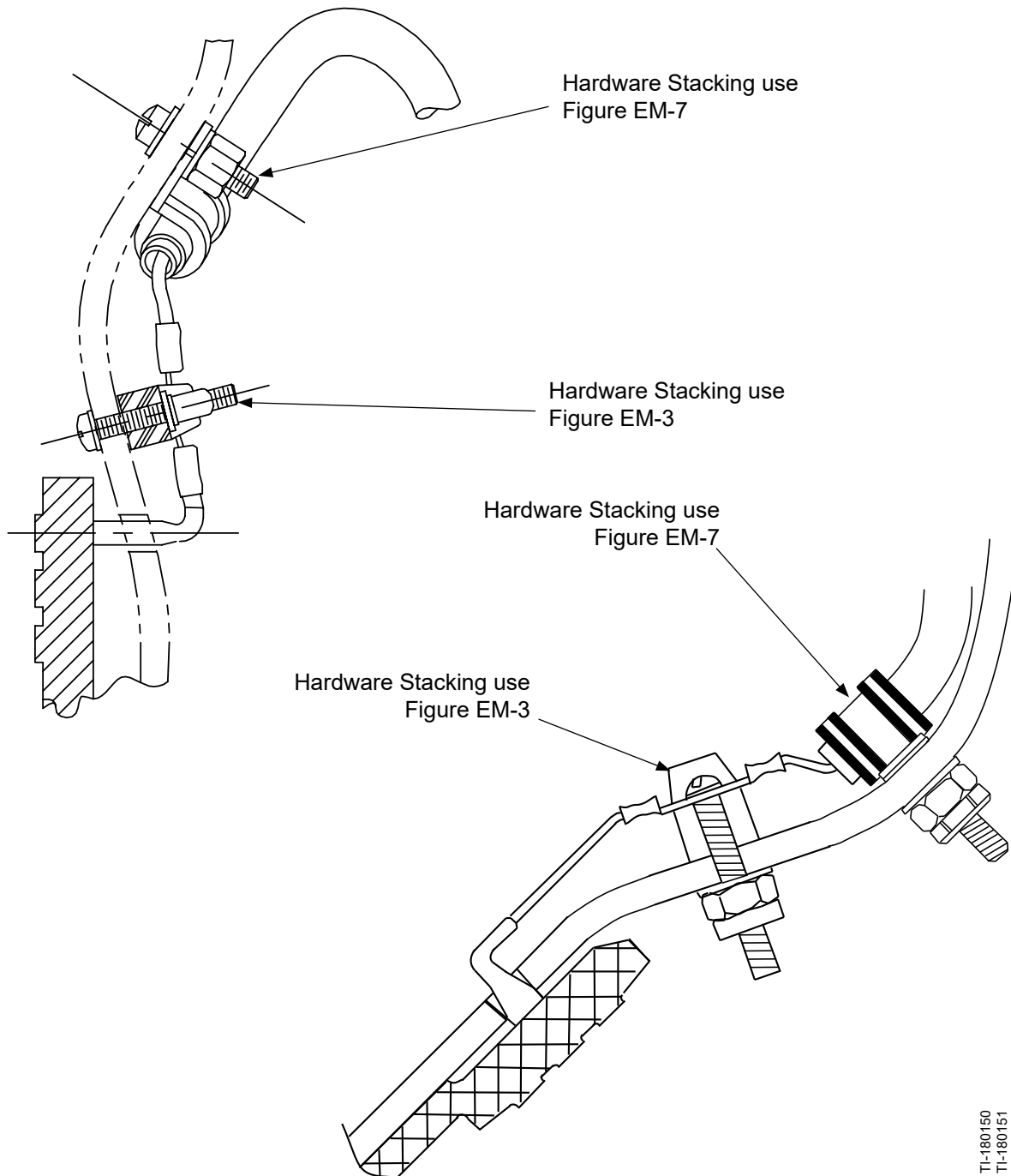


**Terminal Strip Hardware: Bulkhead Mounted  
Figure EM-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**5E2702-1ALT, 5E2729-1ALT, 67-870-1ALT, and 67-932-1ALT**

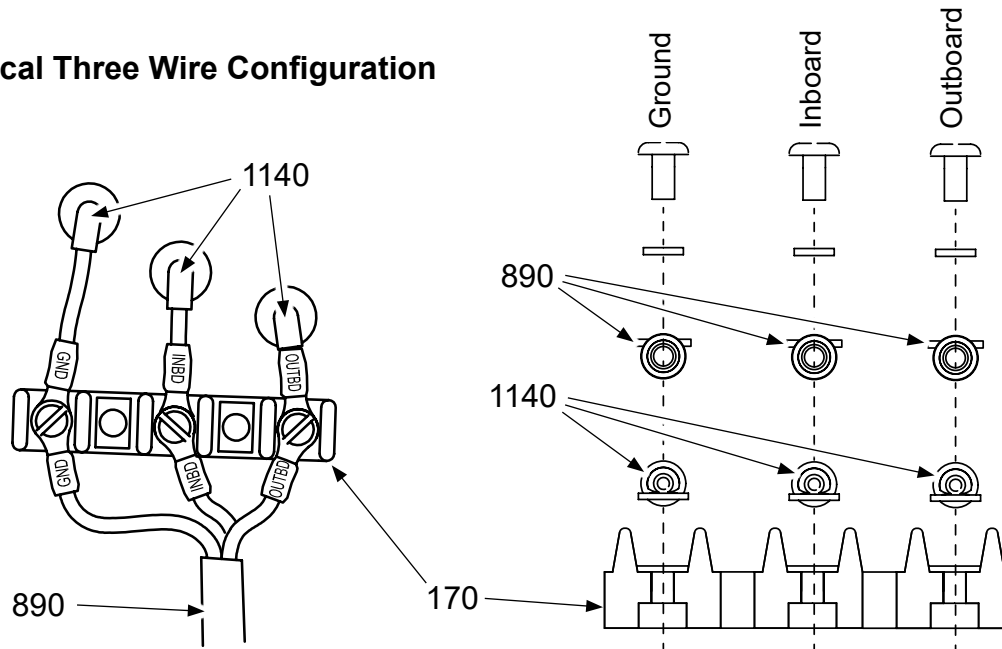


**Terminal Strip and Loop Clamp to Bulkhead Attachment  
Figure EM-4**

HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**5E2702-1ALT, 5E2729-1ALT, 67-870-1ALT, and 67-932-1ALT**

**Typical Three Wire Configuration**



**NOTE:** The illustrations show slip ring wires on a typical right-hand (rotation) propeller.

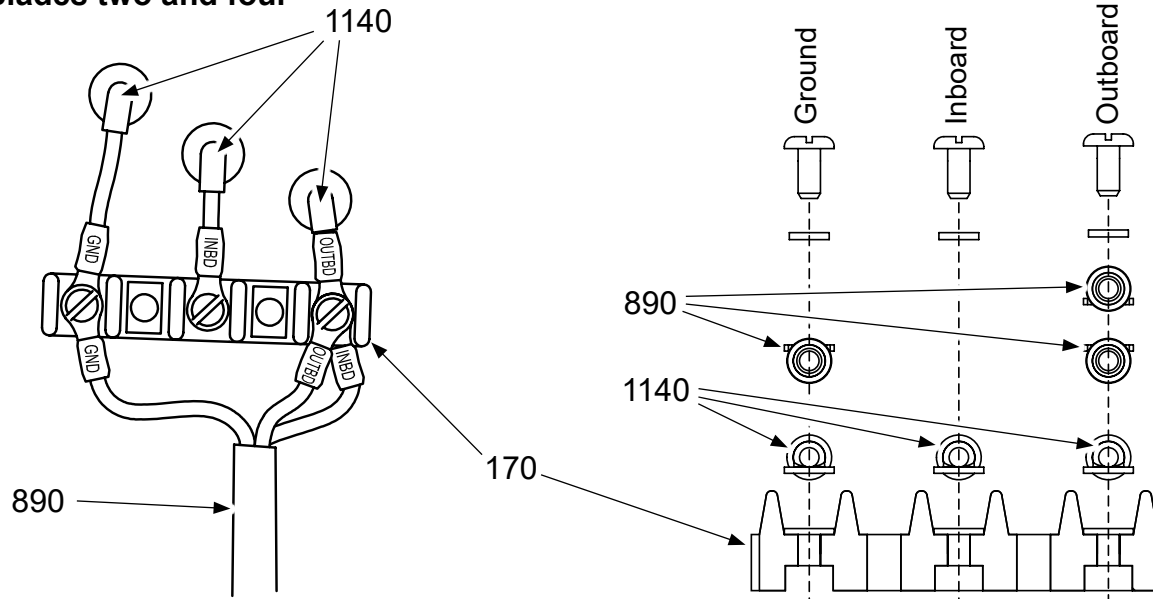
**Terminal Strip Lead Wire Configuration: Typical 3-Wire  
Figure EM-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

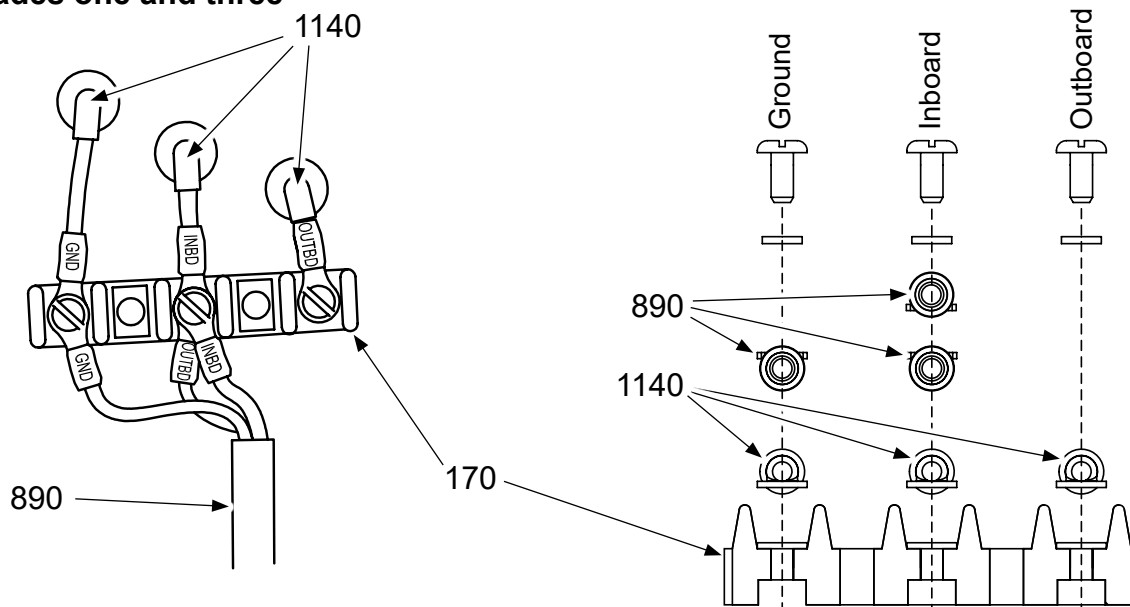
**5E2702-1ALT, 5E2729-1ALT, 67-870-1ALT, and 67-932-1ALT**

**Blades two and four**



**NOTE:** The illustrations show slip ring wires on a typical right-hand (rotation) propeller.

**Blades one and three**



TPI-MB-0131

**Crossfire Configuration B**

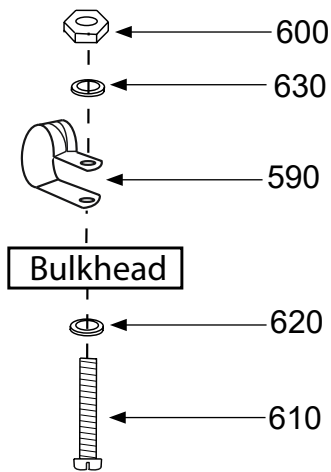
**Terminal Strip Lead Wire Configuration: Crossfire Configuration B  
Figure EM-6**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**5E2702-1ALT, 5E2729-1ALT, 67-870-1ALT, and 67-932-1ALT**

**Configuration AC**

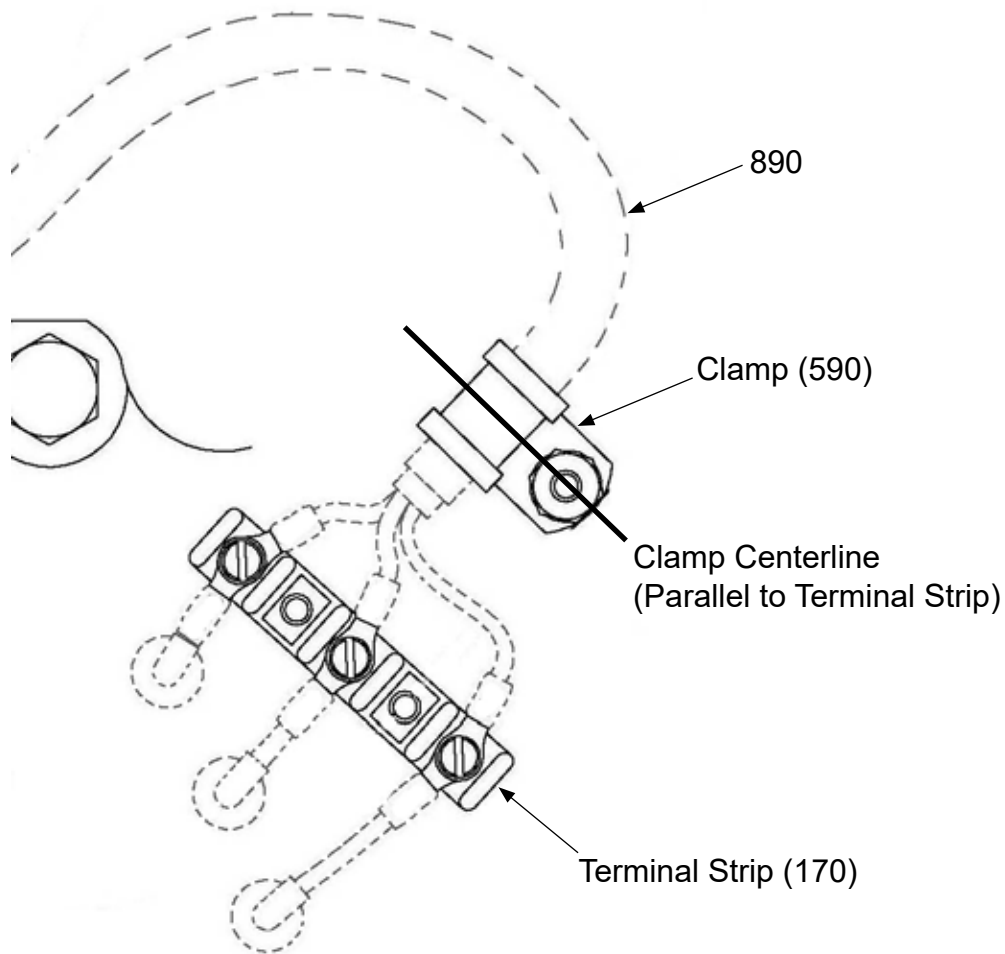


**Loop Clamp to Bulkhead Hardware Configurations  
Figure EM-7**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**5E2702-1ALT, 5E2729-1ALT, 67-870-1ALT, and 67-932-1ALT**



**NOTE:** This figure illustrates the orientation of the clamp to the terminal strip. Wire harness/slip ring wires are shown for reference only. Actual wire harness may have two or three wires.

TPI-MB-0310

**Loop Clamp Orientation  
Figure EM-8**

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**5E2702-1ALT, 5E2729-1ALT, 67-870-1ALT, and 67-932-1ALT**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>5E2702-1ALT</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11EM</b> <b>FIGURES: EM-1 thru EM-5, EM-7, and EM-8</b>		
170	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY ITEM 170A	4	
170A	1H1150-2	• TERMINAL BLOCK ASSEMBLY SUPERSEDES ITEM 170	4	
190	7931-2E1365	• TAPPED EYELET SUPERSEDED BY ITEM 190A	8	Y
190A	2H1365	• TAPPED EYELET SUPERSEDES ITEM 190	8	Y
200	B-3854-41	• WASHER, LOCK	8	Y
210	B-3854-41	• WASHER, LOCK	8	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	8	Y
590	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	4	Y
600	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
610	B-3856-248	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
620	B-3854-42	• WASHER, LOCK	4	Y
630	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
890	7931-4E2369-6	• DE-ICE WIRE HARNESS SUPERSEDED BY ITEM 890A	4	Y
890A	4H2369-6	• DE-ICE WIRE HARNESS SUPERSEDES ITEM 890	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	8	Y
1140	7931-4E2661-1	• SLIP RING ASSEMBLY SUPERSEDED BY ITEM 1140A	1	
1140A	4H2661-1	• SLIP RING ASSEMBLY SUPERSEDES ITEM 1140	1	
1170	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	8	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 5E2702-1ALT**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**5E2702-1ALT, 5E2729-1ALT, 67-870-1ALT, and 67-932-1ALT**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>5E2729-1ALT</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11EM FIGURES: EM-1 thru EM-5, EM-7, and EM-8</b>		
170	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY ITEM 170A	4	
170A	1H1150-2	• TERMINAL BLOCK ASSEMBLY SUPERSEDES ITEM 170	4	
190	7931-2E1365	• TAPPED EYELET SUPERSEDED BY ITEM 190A	8	Y
190A	2H1365	• TAPPED EYELET SUPERSEDES ITEM 190	8	Y
200	B-3854-41	• WASHER, LOCK	8	Y
210	B-3854-41	• WASHER, LOCK	8	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	8	Y
590	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	4	Y
600	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
610	B-3856-248	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
620	B-3854-42	• WASHER, LOCK	4	Y
630	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
890	7931-4E2369-4	• DE-ICE WIRE HARNESS SUPERSEDED BY ITEM 890A	4	Y
890A	4H2369-4	• DE-ICE WIRE HARNESS SUPERSEDES ITEM 890	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	8	Y
1140	7931-4E2661-1	• SLIP RING ASSEMBLY SUPERSEDED BY ITEM 1140A	1	
1140A	4H2661-1	• SLIP RING ASSEMBLY SUPERSEDES ITEM 1140	1	
1170	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	8	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 5E2729-1ALT**

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**5E2702-1ALT, 5E2729-1ALT, 67-870-1ALT, and 67-932-1ALT**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>67-870-1ALT</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11EM</b> <b>FIGURES: EM-1 thru EM-4, and EM-6 thru EM-8</b>		
170	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY ITEM 170A	4	
170A	1H1150-2	• TERMINAL BLOCK ASSEMBLY SUPERSEDES ITEM 170	4	
190	7931-2E1365	• TAPPED EYELET SUPERSEDED BY ITEM 190A	8	Y
190A	2H1365	• TAPPED EYELET SUPERSEDES ITEM 190	8	Y
200	B-3854-41	• WASHER, LOCK	8	Y
210	B-3854-41	• WASHER, LOCK	8	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	8	Y
590	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	4	Y
600	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
610	B-3856-248	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
620	B-3854-42	• WASHER, LOCK	4	Y
630	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
890	7931-4E2369-5	• DE-ICE WIRE HARNESS SUPERSEDED BY ITEM 890A	4	Y
890A	4H2369-5	• DE-ICE WIRE HARNESS SUPERSEDES ITEM 890	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	8	Y
1140	7931-4E2661-1	• SLIP RING ASSEMBLY SUPERSEDED BY ITEM 1140A	1	
1140A	4H2661-1	• SLIP RING ASSEMBLY SUPERSEDES ITEM 1140	1	
1170	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	8	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 67-870-1ALT**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**5E2702-1ALT, 5E2729-1ALT, 67-870-1ALT, and 67-932-1ALT**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>67-932-1ALT</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11EM FIGURES: EM-1 thru EM-5, EM-7, and EM-8</b>		
170	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDES ITEM 170A	4	
170A	7931-1E1150-2	• TERMINAL STRIP, E.P.D. SYSTEM SUPERSEDED BY ITEM 170	4	
190	2H1365	• TAPPED EYELET SUPERSEDES ITEM 190A	8	Y
190A	7931-2E1365	• TAPPED EYELET SUPERSEDED BY ITEM 190	8	Y
200	B-3854-41	• WASHER, LOCK	8	Y
210	B-3854-41	• WASHER, LOCK	8	Y
220	B-6637-34	• SCREW, PAN HEAD, CRES	8	Y
590	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	4	Y
600	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
610	B-3856-248	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
620	B-3854-42	• WASHER, LOCK	4	Y
630	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
890	7931-4E2369-4	• DE-ICE WIRE HARNESS SUPERSEDED BY ITEM 890A	4	Y
890A	4H2369-4	• DE-ICE WIRE HARNESS SUPERSEDES ITEM 890	4	Y
910	B-3852-2-0	• STRAP, TIEDOWN, PLASTIC	8	Y
930	B-3852-5-0	• STRAP, TIEDOWN, PLASTIC	8	Y
1140	7931-4E2661-1	• SLIP RING ASSEMBLY SUPERSEDED BY ITEM 1140A	1	
1140A	4H2661-1	• SLIP RING ASSEMBLY SUPERSEDES ITEM 1140	1	
1170	A-2070-7	• SCREW, 1/4-28, BUTTON HEAD	8	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 67-932-1ALT**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**65-410-1P**

**EN. Installation Instruction 11EN**

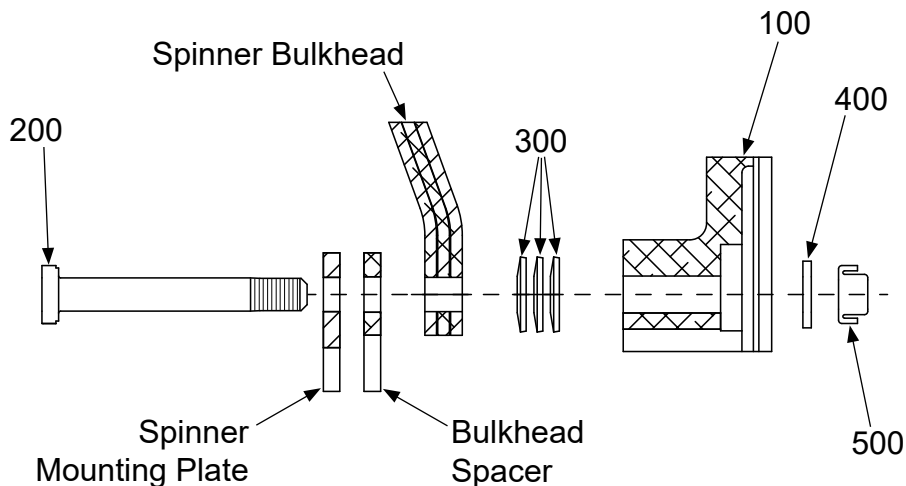
- (1) Refer to the Goodrich Corporation drawing listed below for installation instructions - **except** install the slip ring in accordance with Figure EN-1 in this section:

(a) 7E1490 Rev. A

- 1 Refer to the following Hartzell Propeller LLC documents for cross-reference information about Goodrich Corporation part numbers:

- a The Vendor Cross-Reference chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02)
- b Hartzell Propeller Service Letter HC-SL-30-259
- c Hartzell Propeller Service Letter HC-SL-30-260

**ATTENTION:** AFTER INSTALLATION, COMPLETE A SLIP RING RUN-OUT CHECK IN ACCORDANCE WITH THE CHECK CHAPTER OF THIS MANUAL.



**Slip Ring Installation  
Figure EN-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**65-410-1P**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>65-410-1P</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11EN FIGURE: EN-1</b>		
100	4H1526-4	SLIP RING ASSEMBLY	1	
200	B-3865-16A	BOLT, 1/4-28, HEX HEAD, CRES	9	Y
300	B-7076-42	BELLEVILLE SPRING WASHER	27	Y
400	B-3837-0432	WASHER, CORROSION RESISTANT	9	Y
500	B-3808-4	NUT, HEX, SELF-LOCKING	9	Y
-	105235	WIRE HARNESS	3	Y
-	B-3852-1-0	STRAP, TIEDOWN, PLASTIC	9	Y
-	B-3852-6-0	STRAP, TIEDOWN, PLASTIC	6	Y
-	3H1271-1	CLIP, LEAD STRAP	3	
-	1H1150-2	TERMINAL BLOCK ASSEMBLY	3	
-	B-6631-233	SCREW, 6-32, FILLISTER HEAD, CRES	6	Y
-	B-3854-41	WASHER, LOCK	6	Y
-	B-3857-WDG4	CLAMP, LOOP, CUSHIONED	3	Y
-	B-3856-246	SCREW, 8-32, FILLISTER HEAD, CRES	3	Y
-	B-3837-N832	WASHER, CORROSION RESISTANT	6	Y
-	B-6655-08	NUT, HEX, SELF-LOCKING	3	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit(s): 65-410-1P**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**65-025-1M**

**EO. Installation Instruction 11EO**

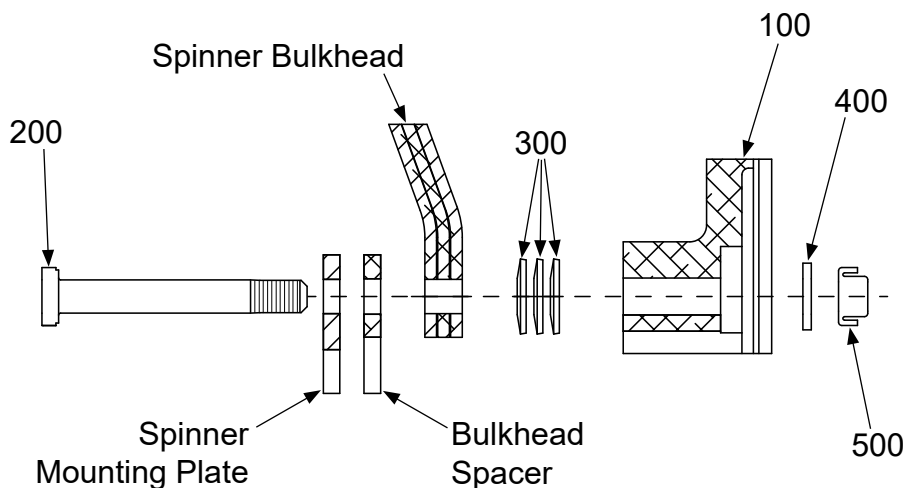
- (1) Refer to the Goodrich Corporation drawing listed below for installation instructions - **except** install the slip ring (100) in accordance with Figure EO-1 in this section:

(a) 7E1246 Rev. M

- 1 Refer to the following Hartzell Propeller LLC documents for cross-reference information about Goodrich Corporation part numbers:

- a The Vendor Cross-Reference chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02)
- b Hartzell Propeller Service Letter HC-SL-30-259
- c Hartzell Propeller Service Letter HC-SL-30-260

**ATTENTION:** AFTER INSTALLATION, COMPLETE A SLIP RING RUN-OUT CHECK IN ACCORDANCE WITH THE CHECK CHAPTER OF THIS MANUAL.



**Slip Ring Installation  
Figure EO-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**65-025-1M**

EO. Installation Instruction 11EO, continued

- (2) Alternate Configuration for Terminal Strip Hardware used with Spinner Bulkhead D-3437-1(P)
- (a) The D-3437-1(P) spinner bulkhead incorporates B-7333-120 rivnuts and B-6631-232 screws to attach the terminal strips to the bulkhead.

**CAUTION:** MAKE SURE THE PROPELLER MOUNTING HARDWARE DOES NOT INTERFERE WITH THE RIVNUTS AND SCREWS USED TO ATTACH THE TERMINAL STRIP TO THE BULKHEAD.

- (b) When installed on the aircraft, aircraft mounted hardware may damage the rivnuts and screws.
- (c) To correct the interference, remove the rivnuts and reattach the terminal strip to the bulkhead in accordance with the following steps:
- 1 Remove the rivnuts using standard maintenance practices.
  - 2 Using the screws (625), washers (700), and tapped eyelets (800), attach the terminal strip (900) to the bulkhead in accordance with the Alternate Configuration shown in Figure EO-2.
  - 3 Torque the screws (625) to 10-12 In-Lb (1.12-1.35 N•m).
- (3) Alternate Configuration for Loop Clamp Hardware used with Spinner Bulkhead D-3437-1(P).

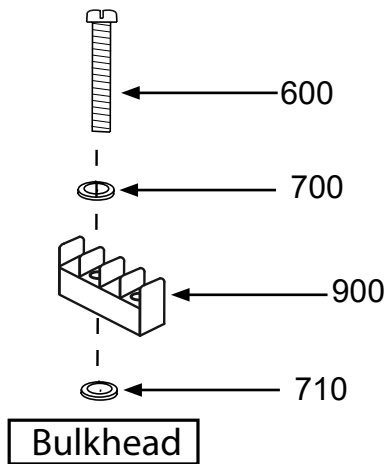
**CAUTION:** MAKE SURE THE AIRFRAME MOUNTED HARDWARE DOES NOT INTERFERE WITH THE HARDWARE USED TO ATTACH THE LOOP CLAMP TO THE BULKHEAD.

- (a) When installed on the aircraft, aircraft mounted hardware may interfere with hardware used to attach the loop clamp (1000) to the bulkhead.
- (b) To correct the interference, remove the loop clamp hardware and reattach the loop clamp (1000) to the bulkhead in accordance with the following steps:
- 1 Remove the loop clamp (1000) and attaching hardware from the bulkhead.
  - 2 Using the screw (1150), washers (1200), and nut (1300), attach the loop clamp (1000) to the bulkhead in accordance with the Alternate Configuration shown in Figure EO-3.
  - 3 Torque the screw (1150) to 22-25 In-Lbs. (2.5-2.8 N•m).

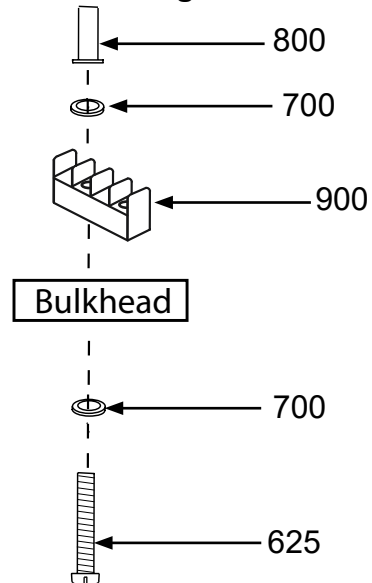
**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**65-025-1M**

**Standard Configuration**



**Alternate Configuration**



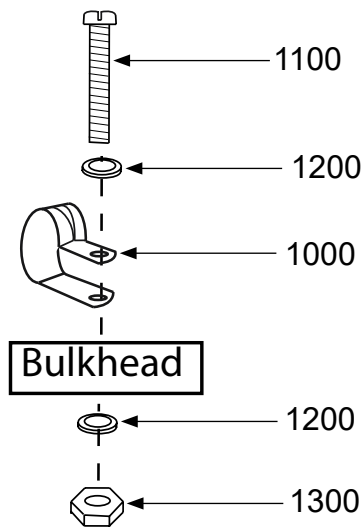
Wire harness attaching hardware (included w/terminal strip)	
Washer P/N	Screw P/N
B-3854-40	B-6637-13

**Terminal Strip Hardware Configurations  
Figure EO-2**

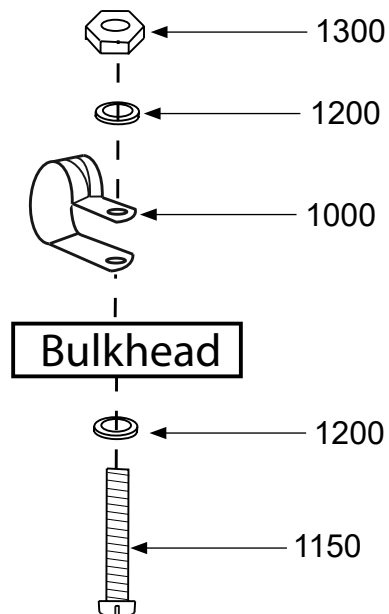
**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**65-025-1M**

**Standard Configuration**



**Alternate Configuration**



**Loop Clamp Hardware Configurations  
Figure EO-3**

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

## 65-025-1M

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>65-025-1M</b>	<b>PROPELLER DE-ICE KIT (ONE PROP)</b> <b>INSTALLATION INSTRUCTION 11EO</b> <b>FIGURES: EO-1 THRU EO-3</b>		
100	4H1526-4	• SLIP RING ASSEMBLY	1	
200	B-3865-16A	• BOLT, 1/4-28, HEX HEAD, CRES	9	Y
300	B-7076-42	• BELLEVILLE SPRING WASHER	27	
400	B-3837-0432	• WASHER, CORROSION RESISTANT	9	Y
500	B-3808-4	• NUT, HEX, SELF-LOCKING	9	Y
		<b>TERMINAL STRIP HARDWARE (STANDARD CONFIGURATION)</b>		
600	B-6631-232	• SCREW, 6-32, FILLISTER HEAD, CRES	6	Y
700	B-3854-41	• WASHER, LOCK	6	Y
710	B-3837-N632	• WASHER, CORROSION RESISTANT	6	Y
900	1H1150-2	• TERMINAL STRIP, E.P.D. SYSTEM	3	
		<b>TERMINAL STRIP HARDWARE (ALTERNATE CONFIGURATION)</b>		
625	B-6637-34	SCREW, PAN HEAD	6	Y
700	B-3854-41	WASHER, LOCK	12	Y
800	2H1365	TAPPED EYELET	6	Y
900	1H1150-2	TERMINAL STRIP, E.P.D. SYSTEM	3	
		<b>LOOP CLAMP HARDWARE (STANDARD CONFIGURATION)</b>		
1000	B-3857-WDG4	• CLAMP, LOOP, CUSHIONED	3	Y
1100	B-3856-246	• SCREW, 8-32, FILLISTER HEAD, CRES	3	Y
1200	B-3837-N832	• WASHER, CORROSION RESISTANT	6	Y
1300	B-6655-08	• NUT, HEX, SELF-LOCKING	3	Y
		<b>LOOP CLAMP HARDWARE (ALTERNATE CONFIGURATION)</b>		
1000	B-3857-WDG4	CLAMP, LOOP, CUSHIONED	3	Y
1150	B-6637-34	SCREW, PAN HEAD	3	Y
1200	B-3837-N832	WASHER, CORROSION RESISTANT	6	Y
1300	B-6655-08	NUT, HEX, SELF-LOCKING	3	Y
-	3H1883-2	• ASSEMBLY, TERMINAL CLAMP	3	
-	B-3864-37	• • WASHER, LOCK, INTERNAL TOOTH	3	Y
-	B-6641-265	• • NUT, HEX, BRASS	3	
-	B-3864-38	• WASHER, LOCK, INTERNAL TOOTH	3	Y
-	B-6977-8	• SCREW, 8-32, FILLISTER HEAD	3	Y
-	B-6658-8	• SCREW, 10-32, FILLISTER HEAD	6	Y
-	B-3837-0332	• WASHER, CORROSION RESISTANT	6	Y
-	B-6735	• CLAMP, LOOP, CUSHIONED	3	Y
-	4H1889-2	• DE-ICE WIRE HARNESS	3	Y

- ITEM NOT ILLUSTRATED

## Electric De-ice Kit: 65-025-1M

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**65-025-1M**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):

**77-955-1M**

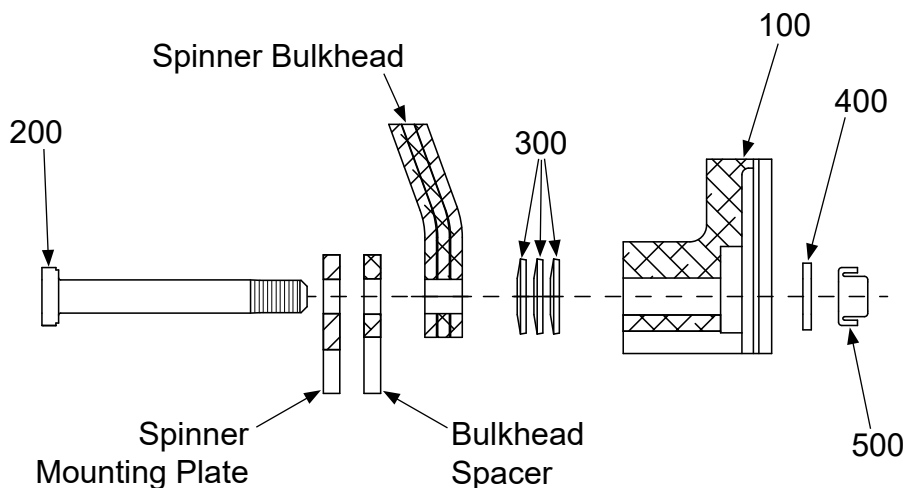
**EP. Installation Instruction 11EP**

- (1) Refer to the Goodrich Corporation drawing listed below for installation instructions - **except** install the slip ring in accordance with Figure EP-1 in this section:

(a) 7E1202 Rev. V

- 1 Refer to the following Hartzell Propeller LLC documents for cross-reference information about Goodrich Corporation part numbers:
  - a The Vendor Cross-Reference chapter of Hartzell Propeller Standard Practices Manual 202A (61-01-02)
  - b Hartzell Propeller Service Letter HC-SL-30-259
  - c Hartzell Propeller Service Letter HC-SL-30-260

**ATTENTION:** AFTER INSTALLATION, COMPLETE A SLIP RING RUN-OUT CHECK IN ACCORDANCE WITH THE CHECK CHAPTER OF THIS MANUAL.



**Slip Ring Installation  
Figure EP-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**77-955-1M**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>77-955-1M</b>	<b>PROPELLER DE-ICE KIT (ONE PROP) INSTALLATION INSTRUCTION 11EP FIGURE: EP-1</b>		
100	4H1526-4	SLIP RING ASSEMBLY	1	
200	B-3865-16A	BOLT, 1/4-28, HEX HEAD, CRES	9	Y
300	B-7076-42	BELLEVILLE SPRING WASHER	27	Y
400	B-3837-0432	WASHER, CORROSION RESISTANT	9	Y
500	B-3808-4	NUT, HEX, SELF-LOCKING	9	Y
-	4H1889-2	WIRE HARNESS	3	Y
-	B-6735	CLAMP, LOOP, CUSHIONED	3	Y
-	3H1883-2	TERMINAL CLAMP ASSEMBLY	3	
-	1H1150-2	TERMINAL BLOCK ASSEMBLY	3	
-	B-6631-232	SCREW, 6-32, FILLISTER HEAD, CRES	6	Y
-	B-3854-41	WASHER, LOCK	6	Y
-	B-3856-246	SCREW, 8-32, FILLISTER HEAD, CRES	3	Y
-	B-3837-N832	WASHER, CORROSION RESISTANT	6	Y
-	B-6655-08	NUT, HEX, SELF-LOCKING	3	Y
-	B-3837-0332	WASHER, CORROSION RESISTANT	6	Y
-	B-6658-8	SCREW, 10-32, FILLISTER HEAD	6	Y
-	B-6977-8	SCREW, 8-32, FILLISTER HEAD	3	Y
-	B-3864-38	WASHER, LOCK, INTERNAL TOOTH	3	Y
-	B-3857-WDG4	CLAMP, LOOP, CUSHIONED	3	Y

- ITEM NOT ILLUSTRATED

**Electric De-ice Kit: 77-955-1M**



## APPENDIX

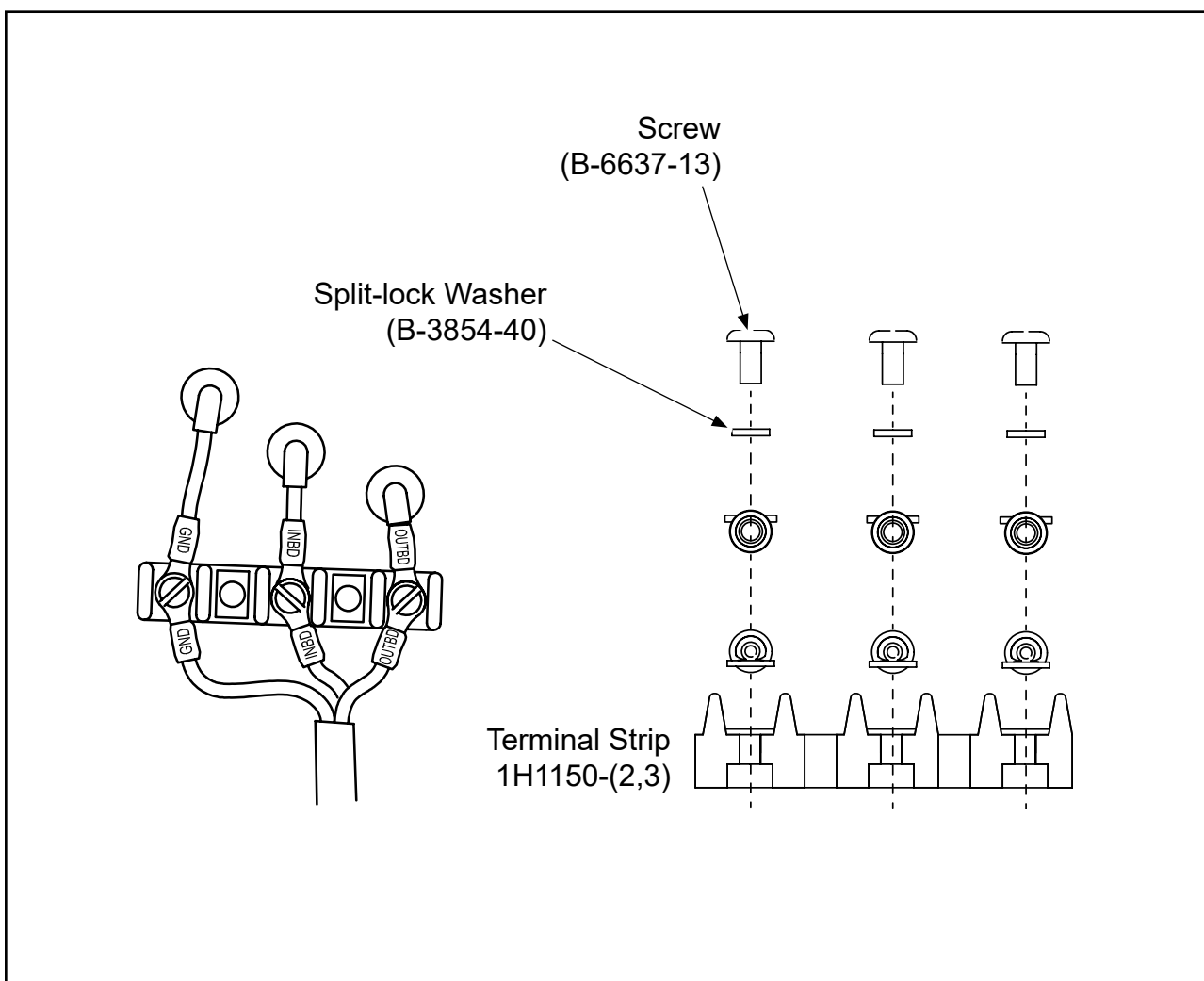
### 1. Terminal Strip Hardware

#### A. Screws/Washers to Attach Wires to Terminal Strip (Refer to Figure: Appendix-1)

- (1) The screws/washers used to attach wires to the terminal strip are supplied with the terminal strip assembly. If replacement screws/washers are required they can be ordered separately using the part numbers listed below:

(a) For terminal strip P/N 1H1150-(2,3):

- 1 Split-lock Washer P/N: B-3854-40
- 2 Screw P/N: B-6637-13



**Terminal Strip Hardware**  
**Figure: Appendix-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

2. De-ice Overhaul Kits

(Refer to "Table: Appendix-1" for a list of available De-ice Overhaul Kits)

A. General

- (1) The de-ice overhaul kit will be identified by the de-ice kit part number and "-OH". Similar to propeller overhaul kits.
- (2) Refer to Hartzell Propeller Application Guide 159 (61-02-59) for the aircraft application for installation of each de-ice kit.
- (3) Contact the Hartzell Propeller Product Support Department with any questions regarding mandatory replacement parts or de-ice overhaul kits.

Telephone: (937) 778-4379 8am - 5pm US Eastern Time

Fax: (937) 778-4215

E-mail: techsupport@hartzellprop.com

<b>De-ice Overhaul Kit Part Number</b>	<b>Description</b>
65-090-1-OH	De-ice Overhaul Kit, 4H1188-3 Boot, with Start Locks
65-090-1-OH*1	De-ice Overhaul Kit, 4H1188-5 Boot, with Start Locks
65-090-1-OH*2	De-ice Overhaul Kit, 4H1188-3 Boot, without Start Locks
65-090-1-OH*3	De-ice Overhaul Kit, 4H1188-5 Boot, without Start Locks
65-165-1-OH	De-ice Overhaul Kit, 4H1188-7 Boot
65-470-3-OH	De-ice Overhaul Kit, 4H2598-10 Boot
67-050-1-OH	De-ice Overhaul Kit, 4H2200-10 Boot
67-060-4-OH	De-ice Overhaul Kit, 4H2575-10 Boot, uses A-2070-10 bolts
67-060-4AL-OH	De-ice Overhaul Kit, 4H2575-10 Boot, uses A-2070-7 bolts
67-340-5-OH	De-ice Overhaul Kit, 4H2560-10 Boot
67-625-1-OH	De-ice Overhaul Kit, 4H2595-7 Boot
67-680-5-OH	De-ice Overhaul Kit, 4H3017-1 Boot
67-680-6-OH	De-ice Overhaul Kit, 4H3400-1 Boot
103769-OH	De-ice Overhaul Kit, Pilatus PC-21
105062-OH	De-ice Overhaul Kit
105934-OH	De-ice Overhaul Kit
106298-OH	De-ice Overhaul Kit, 4H2271-12 Boot

**De-ice Overhaul Kits  
Table: Appendix-1**

B. Contents of the Kit

- (1) De-ice boots are included in the de-ice overhaul kits
  - (a) Different applications may use the same de-ice kit but different de-ice boots.
- (2) When de-ice overhaul kits contain application-specific boots or installation hardware, the de-ice overhaul kit part number will include an "\*"() at the end, and the kit description will specify the variation from the standard kit.

Example:

xxxxxx-OH	De-ice O/H Kit
xxxxxx-OH*1	De-ice O/H Kit, 4H1188-5 Boot, with Start Locks
xxxxxx-OH*2	De-ice O/H Kit, 4H1188-3 Boot, without Start Locks

- (3) Refer to the applicable parts list in this chapter for a complete list of parts that must be replaced at overhaul.

NOTE: The de-ice overhaul kits do not contain parts that are listed as alternates.

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HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180

AIRFRAME DE-ICE KIT INSTALLATION and PARTS

NOTE: Each section includes the installation instructions and parts list(s) for the applicable airframe de-ice kit(s).

<u>Airframe Kit Part Number:</u>	<u>Section/Page</u>
7931-5E2647-2 .....	12A-1
7931-5E2682-2 .....	12B-1
7931-5E2689-2 .....	12AS-1
7931-5E2707-2 .....	12C-1
7931-5E2715-2 .....	12D-1
7931-5E2793-4 .....	12E-1
7931-65-530-2.....	12AT-1
7931-65-600-2.....	12F-1
7931-65-600-5.....	12F-1
7931-65-610-2.....	12AU-1
7931-67-195.....	12G-1
7931-67-750-2.....	12H-1
7931-67-805-2.....	12I-1
7931-67-815-2.....	12J-1
7931-67-825-2.....	12K-1
7931-67-825-3.....	12K-1
7931-67-830-2.....	12L-1
7931-67-835-2.....	12AV-1
7931-67-931-2.....	12M-1
7931-67-940-2.....	12N-1
7931-67-940-3.....	12N-1
7931-67-941-2.....	12O-1
7931-67-942-2.....	12P-1
102014-2 .....	12Q-1
102014-3 .....	12Q-1
102014-4 .....	12Q-2
102014-5 .....	12Q-2
102195-2 .....	12Q-3

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

**AIRFRAME DE-ICE KIT INSTALLATION and PARTS - continued**

<b><u>Airframe Kit Part Number:</u></b>	<b><u>Section/Page</u></b>
102544-2 .....	12R-1
102544-3 .....	12S-1
102600-2 .....	12T-1
102960-2 .....	12U-1
102998-2 .....	12V-1
102998-3 .....	12W-1
103294-4 .....	12X-1
103294-5 .....	12X-1
103307 .....	12V-1
103308 .....	12W-1
103430 .....	12AP-1
103643 .....	12Y-1
103644 .....	12Y-1
103652 .....	12Z-1
104009 .....	12AA-1
104128 .....	12AA-1
104181 .....	12AB-1
104252 .....	12AC-1
104265 .....	12AC-1
104268 .....	12AC-1
104430 .....	12AC-2
104958 .....	12AC-2
105068 .....	12AC-2
105287 .....	12AC-3
105468 .....	12AC-3
105612 .....	12AC-3
105753 .....	12AC-4
105940 .....	12AD-1
106095 .....	12AE-1
106337 .....	12AF-1

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

**AIRFRAME DE-ICE KIT INSTALLATION and PARTS - continued**

<u><b>Airframe Kit Part Number:</b></u>	<u><b>Section/Page</b></u>
106530 .....	12AG-1
106558 .....	12AG-1
106592 .....	12AG-1
106612 .....	12AG-2
106819 .....	12AJ-1
106832 .....	12AH-1
106855 .....	12AI-1
106856 .....	12AI-1
107002 .....	12AI-1
107266 .....	12AJ-1
107595 .....	12AK-1
107606 .....	12AN-1
107718 .....	12AK-1
107983(X) .....	12AL-1
107949 .....	12AO-1
108005 .....	12AM-1
108053 .....	12AE-1
108347 .....	12AH-1
108423 .....	12AQ-1
108585 .....	12AQ-1
108606 .....	12AR-1
109546 .....	12AW-1

AIRFRAME DE-ICE KIT INSTALLATION and PARTS - continued

<u>Appendix</u>	<u>Section/Page</u>
1. Brush Block Assemblies .....	App-1
3H1443-7 Brush Assembly .....	App-2
Brush Module Assemblies: 3E2011-(1,2,3) and 3H2011-(1,2,3).....	App-4
Universal Brush Module Assembly: 3H2011-10 .....	App-5
Brush Block Assemblies: 3H2042-1 and 3H2042-2.....	App-8
Brush Block Assemblies: 3H2044-1 and 3H2044-3.....	App-10
Brush Block Assembly: 3H2044-4 .....	App-11
Brush Block Assembly: 3H2062-2 .....	App-13
Brush Block Assembly: 3H2071.....	App-15
Brush Block Assemblies: 3H2090-1 and 3H2090-2.....	App-17
Brush Block Assembly: 102354 .....	App-19
Brush Block Assembly: 103158 .....	App-21
Brush Block Assembly: 105404 .....	App-23



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

**7931-5E2647-2**

A. Installation Instruction 12A

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

(a) 5E2647 Rev. H

- 1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

- a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)
- b Hartzell Propeller Service Letter HC-SL-30-259
- c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**7931-5E2647-2**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-5E2647-2</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12A</b>		
	3H2044-3	• MODULAR BRUSH BLOCK ASSEMBLY	2	
	7931-3E2044-3	• MODULAR BRUSH BLOCK ASSEMBLY, ALTERNATE FOR 3H2044-3	2	
	1H1157	• SHIM, BRUSH BLOCK ASS'Y	4	
	7931-1E1157	• SHIM, BRUSH BLOCK ASS'Y, ALTERNATE FOR 1H1157	4	
	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	8	Y
	B-6637-52	• SCREW, PAN HEAD, CRES	4	
	3H2223	• MOUNTING BRACKET	2	
	7931-3E2223	• MOUNTING BRACKET, ALTERNATE FOR 3H2223	2	
	7931-25244-30	• CIRCUIT BREAKER, 30 AMP	2	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit: 7931-5E2647-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**7931-5E2682-2**

**B.     Installation Instruction 12B**

(1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

(a) 5E2682 Rev. D

1     Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

a     The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)

b     Hartzell Propeller Service Letter HC-SL-30-259

c     Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following electric de-ice kit(s):  
**7931-5E2682-2**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-5E2682-2</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12B</b>		
	3H1389-2	• AMMETER, 14-18 AMPS	1	
	7931-3E1389-2	• AMMETER, 14-18 AMPS, ALTERNATE FOR 3H1389-2	1	
	1H1157	• SHIM, BRUSH BLOCK ASS'Y	2	
	7931-1E1157	• SHIM, BRUSH BLOCK ASS'Y, ALTERNATE FOR 1H1157	2	
	B-3837-N832	• WASHER, CORROSION RESISTANT	2	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	2	Y
	B-3854-42	• WASHER, LOCK	2	Y
	B-6637-51	• SCREW, PAN HEAD, CRES	2	
	B-3837-0463	• WASHER, CORROSION RESISTANT	2	Y
	4H3076-1	• ASSEMBLY, MOV MODULE	1	
	7931-4E3076-1	• ASSEMBLY, MOV MODULE, ALTERNATE FOR 4H3076-1	1	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit: 7931-5E2682-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**7931-5E2707-2**

C. Installation Instruction 12C

(1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

(a) 5E2707 Rev. D

1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)

b Hartzell Propeller Service Letter HC-SL-30-259

c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

**7931-5E2707-2**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-5E2707-2</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12C</b>		
	3H1389-1	• AMMETER, 17-21 AMPS	1	
	7931-3E1389-1	• AMMETER, 17-21 AMPS, ALTERNATE FOR 3H1389-1	1	
	B-3837-N832	• WASHER, CORROSION RESISTANT	2	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	2	Y
	B-3854-42	• WASHER, LOCK	2	Y
	B-6637-51	• SCREW, PAN HEAD, CRES	2	
	4H3076-3	• ASSEMBLY, MOV MODULE	1	
	7931-4E3076-3	• ASSEMBLY, MOV MODULE, ALTERNATE FOR 4H3076-3	1	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit: 7931-5E2707-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**7931-5E2715-2**

D. Installation Instruction 12D

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

(a) 5E2715 Rev. J

- 1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

- a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)
- b Hartzell Propeller Service Letter HC-SL-30-259
- c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**7931-5E2715-2**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-5E2715-2</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12D</b>		
	3H2090-1	• MODULAR BRUSH BLOCK ASSEMBLY	1	
	7931-3E2090-1	• MODULAR BRUSH BLOCK ASSEMBLY, ALTERNATE FOR 3H2090-1	1	
	1H1157	• SHIM, BRUSH BLOCK ASS'Y	1	
	7931-1E1157	• SHIM, BRUSH BLOCK ASS'Y, ALTERNATE FOR 1H1157	1	
	B-6655-08	• NUT, HEX, SELF-LOCKING	2	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
	B-6637-50	• SCREW, PAN HEAD, CRES	2	
	3H2237	• BRACKET BRUSH BLOCK	1	
	7931-3E2237	• BRACKET BRUSH BLOCK, ALTERNATE FOR 3H2237	1	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit: 7931-5E2715-2**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

**7931-5E2793-4**

E. Installation Instruction 12E

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

(a) 5E2793 Rev. C

- 1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

- a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)
- b Hartzell Propeller Service Letter HC-SL-30-259
- c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

**7931-5E2793-4**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-5E2793-4</b>	<b>AIRFRAME DE-ICE KIT (NO A/C AND REPLACING A MCCAULEY PROPELLER) INSTALLATION INSTRUCTION 12E</b>		
	3H1951	• MOUNTING PLATE - SPLIT	2	
	7931-3E1951	• MOUNTING PLATE - SPLIT, ALTERNATE FOR 3H1951	2	
	4H3422-1	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E3422-1	2	
	7931-4E3422-1	• SLIP RING ASSEMBLY SUPERSEDED BY 4H3422-1	2	
	B-3869-3	• NUT, SELF-LOCKING, CRES	24	
	101131-10L	• WASHER, FLAT, REDUCED DIAMETER	24	Y
	B-6606-16P	• SCREW, 10-32, CAP	24	
	B-3851-0363	• WASHER	2	Y
	B-3857-WDG3	• CLAMP, LOOP, CUSHIONED	2	
	B-6658-10	• SCREW, 10-32, FILLISTER HEAD	2	
	3H2071	• BRUSH ASSEMBLY, MODULAR	2	
	7931-3E2071	• BRUSH ASSEMBLY, MODULAR, ALTERNATE FOR 3H2071	2	
	2H1212	• SHIM, BRUSH BLOCK	2	
	7931-2E1212	• SHIM, BRUSH BLOCK, ALTERNATE FOR 2H1212	2	
	4H1817-1	• BRACKET, BRUSH BLOCK	2	
	7931-4E1817-1	• BRACKET, BRUSH BLOCK, ALTERNATE FOR 4H1817-1	2	
	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
	B-3856-243	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
	B-3875-25A	• BOLT, 5/16-24, HEX HEAD	4	
	1H1211	• SPACER, E.P.D. SYSTEM (CE-320)	8	
	7931-1E1211	• SPACER, E.P.D. SYSTEM (CE-320) ALTERNATE FOR 1H1211	8	
	B-3851-0532	• WASHER	4	Y

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit: 7931-5E2793-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**7931-65-600-2 and 7931-65-600-5**

F. Installation Instruction 12F

(1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

(a) 7E1784 Rev. D

1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)

b Hartzell Propeller Service Letter HC-SL-30-259

c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**7931-65-600-2 and 7931-65-600-5**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-65-600-2</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12F</b>		
	3H1872-2	• AMMETER, 14-18 AMPS	1	
	7931-3E1872-2	• AMMETER, 14-18 AMPS, ALTERNATE FOR 3H1872-2	1	
	3H1150-10	• TIMER DE-ICE	1	
	7931-3E1150-10	• TIMER, ALTERNATE FOR 3H1150-10	1	
	3H2042-1	• MODULAR BRUSH BLOCK ASS'Y.	2	
	7931-3E2042-1	• MODULAR BRUSH BLOCK ASS'Y., ALTERNATE FOR 3H2042-1	2	
	1H1157	• SHIM, BRUSH BLOCK ASS'Y	2	
	7931-1E1157	• SHIM, BRUSH BLOCK ASS'Y, ALTERNATE FOR 1H1157	2	
	3H1461	• BRACKET, MOUNTING, BRUSH BLOCK	2	
	7931-3E1461	• BRACKET, MOUNTING, BRUSH BLOCK, ALTERNATE FOR 3H1461	2	
	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	8	Y
	B-6637-52	• SCREW, PAN HEAD, CRES	4	
	7931-1E1297	• SPACER SUPERSEDED BY 1H1297	8	
	1H1297	• SPACER SUPERSEDES 7931-1E1297	8	
	B-3875-25A	• BOLT, 5/16-24, HEX HEAD	4	
	7931-91586-1	• MS91586-1 AMMETER SHUNT 30 AMP	1	
	1H1110-1	• CIRCUIT BREAKER SWITCH	1	
	7931-1E1110-1	• SWITCH, CIRCUIT BREAKER 20 AMPS ALTERNATE FOR 1H1110-1	1	
	1H1111	• SWITCH, FACE PLATE	1	
	7931-1E1111	• SWITCH, FACE PLATE, ALTERNATE FOR 1H1111	1	
	7931-3106F2015S	• MS3106F20-15S CONNECTOR SUPERSEDED BY 108987	1	
	108987	• ELECTRICAL CONNECTOR SUPERSEDES 7931-3106F2015S	1	
	1H1211	• SPACER, E.P.D. SYSTEM (CE-320)	8	
	7931-1E1211	• SPACER, E.P.D. SYSTEM (CE-320), ALTERNATE FOR 1H1211	8	
	7931-35058-22	• MS35058-22 SWITCH	1	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit: 7931-65-600-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

**7931-65-600-2 and 7931-65-600-5**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-65-600-5</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12F</b>		
	3H1872-2	• AMMETER, 14-18 AMPS	1	
	7931-3E1872-2	• AMMETER, 14-18 AMPS, ALTERNATE FOR 3H1872-2	1	
	3H1150-10	• TIMER DE-ICE	1	
	7931-3E1150-10	• TIMER, ALTERNATE FOR 3H1150-10	1	
	3H2042-2	• MODULAR BRUSH BLOCK ASS'Y.	2	
	7931-3E2042-2	• MODULAR BRUSH BLOCK ASS'Y, ALTERNATE FOR 3H2042-2	2	
	1H1157	• SHIM, BRUSH BLOCK ASSEMBLY	2	
	7931-1E1157	• SHIM, BRUSH BLOCK ASS'Y, ALTERNATE FOR 1H1157	2	
	3H2581-2	• BRACKET, BRUSH BLOCK ASSEMBLY	2	
	7931-3E2581-2	• BRACKET, BRUSH BLOCK ASSEMBLY, ALTERNATE FOR 3H2581-2	2	
	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	8	Y
	B-6637-52	• SCREW, PAN HEAD, CRES	4	
	7931-1E1297	• SPACER, SUPERSEDED BY 1H1297	8	
	1H1297	• SPACER, SUPERSEDES 7931-1E1297	8	
	B-3875-24A	• BOLT, 5/16-24, HEX HEAD	4	
	7931-91586-1	• MS91586-1 AMMETER SHUNT 30 AMP	1	
	1H1110-1	• CIRCUIT BREAKER SWITCH	1	
	7931-1E1110-1	• SWITCH, CIRCUIT BREAKER 20 AMPS ALTERNATE FOR 1H1110-1	1	
	1H1111	• SWITCH, FACE PLATE	1	
	7931-1E1111	• SWITCH, FACE PLATE, ALTERNATE FOR 1H1111	1	
	7931-3106F2015S	• MS3106F20-15S CONNECTOR SUPERSEDED BY 108987	1	
	108987	• ELECTRICAL CONNECTOR SUPERSEDES 7931-3106F2015S	1	
	1H1211	• SPACER, E.P.D. SYSTEM (CE-320)	8	
	7931-1E1211	• SPACER, E.P.D. SYSTEM (CE-320), ALTERNATE FOR 1H1211	8	
	7931-35058-22	• MS35058-22 SWITCH	1	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit: 7931-65-600-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**7931-65-600-2 and 7931-65-600-5**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**7931-67-195**

G. Installation Instruction 12G

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 7E1431 Rev. L

1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

- a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)
- b Hartzell Propeller Service Letter HC-SL-30-259
- c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**7931-67-195**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-195</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12G</b>		
	3H1389-7	• AMMETER, 29-33 AMPS	1	
	7931-3E1389-7	• AMMETER, 29-33 AMPS, ALTERNATE FOR 3H1389-7	1	
	3H1964-3	• TIMER DE-ICE	1	
	7931-3E1964-3	• TIMER, DE-ICE, ALTERNATE FOR 3H1964-3	1	
	3H2062-2	• MODULAR BRUSH BLOCK ASSEMBLY	2	
	7931-3E2062-2	• MODULAR BRUSH BLOCK ASSEMBLY, ALTERNATE FOR 3H2062-2	2	
	1H1157	• SHIM, BRUSH BLOCK ASS'Y	2	
	7931-1E1157	• SHIM, BRUSH BLOCK ASS'Y, ALTERNATE FOR 1H1157	2	
	7931-4E2032	• DE-ICE MOUNTING BRACKET	2	
	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	8	Y
	B-6637-50	• SCREW, PAN HEAD, CRES	4	
	B-3874-42A	• BOLT, 1/4-28, HEX HEAD	2	
	7931-91586-2	• MS91586-2 AMMETER SHUNT 50 AMP	1	
	7931-454-724	• 454-724 CIRCUIT BREAKER, 35 AMP	1	
	7931-3E1935	• SUPPORT ARM ASSEMBLY	2	
	7931-32370-11	• 32370-11 ILLUM. ROCKER SWITC	1	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit: 7931-67-195**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**7931-67-750-2**

H. Installation Instruction 12H

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 7E1761 Rev. C

1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

- a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)
- b Hartzell Propeller Service Letter HC-SL-30-259
- c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**7931-67-750-2**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-750-2</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12H</b>		
	4H2267-2	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E2267-2	1	
	7931-4E2267-2	• SLIP RING ASSEMBLY SUPERSEDED BY 4H2267-2	1	
	7931-21045-4	• MS21045-4 SELF LOCKING NUT	6	
	B-3837-0432	• WASHER, CORROSION RESISTANT	6	Y
	B-7077-52	• BELLEVILLE SPRING WASHER	6	Y
	B-3384-8H	• BOLT, 1/4-28, HEX HEAD	6	Y
	3H1872-2	• AMMETER, 14-18 AMPS	1	
	7931-3E1872-2	• AMMETER, 14-18 AMPS, ALTERNATE FOR 3H1872-2	1	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit: 7931-67-750-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**7931-67-805-2**

I. Installation Instruction 12I

(1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

(a) 7E1772 Rev. B

1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)

b Hartzell Propeller Service Letter HC-SL-30-259

c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**7931-67-805-2**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-805-2</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12I</b>		
	4H2459-2	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E2459-2	1	
	7931-4E2459-2	• SLIP RING ASSEMBLY SUPERSEDED BY 4H2459-2	1	
	7931-21045-4	• MS21045-4 SELF LOCKING NUT	6	
	B-3837-0432	• WASHER, CORROSION RESISTANT	6	Y
	B-7077-52	• BELLEVILLE SPRING WASHER	6	Y
	B-3384-8H	• BOLT, 1/4-28, HEX HEAD	6	Y
	3H1872-2	• AMMETER, 14-18 AMPS	1	
	7931-3E1872-2	• AMMETER, 14-18 AMPS, ALTERNATE FOR 3H1872-2	1	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit: 7931-67-805-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**7931-67-815-2**

J. Installation Instruction 12J

(1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

(a) 7E1776 Rev. F

1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)

b Hartzell Propeller Service Letter HC-SL-30-259

c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

**7931-67-815-2**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-815-2</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12J</b>		
	7931-3E1872-3	• AMMETER, 17-21 AMPS SUPERSEDED BY 3H1872-3	1	
	3H1872-3	• AMMETER, 17-21 AMPS SUPERSEDES 7931-3E1872-3	1	
	3H1964-3	• TIMER DE-ICE	1	
	7931-3E1964-3	• TIMER, DE-ICE, ALTERNATE FOR 3H1964-3	1	
	3H2090-2	• MODULAR BRUSH BLOCK ASSEMBLY	2	
	7931-3E2090-2	• MODULAR BRUSH BLOCK ASSEMBLY, ALTERNATE FOR 3H2090-2	2	
	1H1157	• SHIM, BRUSH BLOCK ASS'Y	4	
	7931-1E1157	• SHIM, BRUSH BLOCK ASS'Y, ALTERNATE FOR 1H1157	4	
	3H2223	• MOUNTING BRACKET	2	
	7931-3E2223	• MOUNTING BRACKET, ALTERNATE FOR 3H2223	2	
	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	8	Y
	B-6637-50	• SCREW, PAN HEAD, CRES	4	
	7931-91586-1	• MS91586-1 AMMETER SHUNT 30 AMP	1	
	7931-2E1900-1	• SWITCH, CIRCUIT BREAKER SUPERSEDED BY 2H1900-1	1	
	2H1900-1	• SWITCH, CIRCUIT BREAKER SUPERSEDES 7931-2E1900-1	1	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit: 7931-67-815-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**7931-67-825-2 and 7931-67-825-3**

K. Installation Instruction 12K

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

(a) 7E1778 Rev. G

- 1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

- a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)
- b Hartzell Propeller Service Letter HC-SL-30-259
- c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**7931-67-825-2 and 7931-67-825-3**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-825-2</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12K</b>		
	7931-4E2808-5	• DE-ICING TIMER	2	
	7931-3E2535-1	• BRACKET, SYNCHROPHASER PICK-UP	2	
	7931-3E2042-3	• MODULAR BRUSH BLOCK ASS'Y	4	
	1H1157	• SHIM, BRUSH BLOCK ASS'Y	2	
	7931-1E1157	• SHIM, BRUSH BLOCK ASS'Y, ALTERNATE FOR 1H1157	2	
	7931-3E2504-1	• BRACKET, BRUSH BLOCK ASS'Y	4	
	B-6655-08	• NUT, HEX, SELF-LOCKING	12	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	24	Y
	B-6637-48	• SCREW, PAN HEAD, CRES	4	
	B-6637-53	• SCREW, PAN HEAD, CRES	8	
	<b>7931-67-825-3</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12K</b>		
	7931-4E2808-5	• DE-ICING TIMER	1	
	7931-3E2535-1	• BRACKET, SYNCHROPHASER PICK-UP	1	
	7931-3E2042-3	• MODULAR BRUSH BLOCK ASS'Y	2	
	1H1157	• SHIM, BRUSH BLOCK ASS'Y	2	
	7931-1E1157	• SHIM, BRUSH BLOCK ASS'Y, ALTERNATE FOR 1H1157	2	
	7931-3E2504-1	• BRACKET, BRUSH BLOCK ASS'Y	2	
	B-6655-08	• NUT, HEX, SELF-LOCKING	6	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	12	Y
	B-6637-48	• SCREW, PAN HEAD, CRES	2	
	B-6637-53	• SCREW, PAN HEAD, CRES	8	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit: 7931-67-825-2 and 7931-67-825-3**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

**7931-67-830-2**

**L.     Installation Instruction 12L**

- (1) Install the airframe de-ice kit components in accordance with the applicable aircraft TC or STC holder's ICA.

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-830-2</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12L</b>		
	B-3837-N832	• WASHER, CORROSION RESISTANT	3	Y
	B-3854-44	• WASHER, LOCK	2	
	B-6637-52	• SCREW, 8-32, PAN HEAD, CRES.	2	
	B-6655-08	• NUT, HEX, SELF-LOCKING	2	Y
	1H1111	• SWITCH, FACE PLATE	1	
	7931-1E1111	• SWITCH, FACE PLATE ALTERNATE FOR P/N: 1H1111	1	
	7931-1E1140	• SWITCH, CIRCUIT BREAKER 25 AMPS	1	
	1H1157	• SHIM, BRUSH BLOCK	1	
	7931-1E1157	• SHIM, BRUSH BLOCK ASS'Y ALTERNATE FOR P/N: 1H1157	1	
	7931-16997-59	• MS16997-59 SOCKET HD CAP SCREW	2	
	7931-3E1835	• MOUNTING BRACKET, BRUSH BLOCK	1	
	7931-3E1899-1	• TIMER, DE-ICE	1	
	3H2062-2	• MODULAR BRUSH BLOCK ASSEMBLY	1	
	7931-3E2062-2	• MODULAR BRUSH BLOCK ASSEMBLY ALTERNATE FOR P/N: 3H2062-2	1	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit: 7931-67-830-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

**7931-67-830-2**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

**7931-67-931-2**

M. Installation Instruction 12M

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 5E2620 Rev. E

1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)

b Hartzell Propeller Service Letter HC-SL-30-259

c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**7931-67-931-2**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-931-2</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12M</b>		
	3H1872-4	• AMMETER, 27-33 AMPS	1	
	7931-3E1872-4	• AMMETER, 27-33 AMPS, ALTERNATE FOR 3H1872-4	1	
	7931-3E2205-4	• DE-ICING TIMER	1	
	3H2090-1	• MODULAR BRUSH BLOCK ASS'Y	1	
	7931-3E2090-1	• MODULAR BRUSH BLOCK ASS'Y, ALTERNATE FOR 3H2090-1	1	
	1H1157	• SHIM, BRUSH BLOCK ASS'Y	2	
	7931-1E1157	• SHIM, BRUSH BLOCK ASS'Y, ALTERNATE FOR 1H1157	2	
	7931-3E3288-1	• BRACKET, BRUSH BLOCK ASS'Y	1	
	B-6655-08	• NUT, HEX, SELF-LOCKING	2	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
	B-6637-50	• SCREW, PAN HEAD, CRES	2	
	7931-91586-2	• MS91586-2 AMMETER SHUNT	1	
	7931-24523-22	• SWITCH	1	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit: 7931-67-931-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**7931-67-940-2 and 7931-67-940-3**

N. Installation Instruction 12N

(1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

(a) 5E2662 Rev. H

1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)

b Hartzell Propeller Service Letter HC-SL-30-259

c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**7931-67-940-2 and 7931-67-940-3**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-940-2</b>	<b>AIRFRAME DE-ICE KIT W/O AC INSTALLATION INSTRUCTION 12N</b>		
	3H1951	• MOUNTING PLATE - SPLIT	2	
	7931-3E1951	• MOUNTING PLATE - SPLIT, ALTERNATE FOR 3H1951	2	
	4H3422-1	• SLIP RING ASSEMBLY	2	
		SUPERSEDES 7931-4E3422-1		
	7931-4E3422-1	• SLIP RING ASSEMBLY	2	
		SUPERSEDED BY 4H3422-1		
	B-3869-3	• NUT, SELF-LOCKING, CRES	24	
	101131-10L	• WASHER, FLAT, REDUCED DIAMETER	24	Y
	B-3823	• SCREW, 10-32, CAP	24	
	B-3851-0363	• WASHER	2	Y
	B-3857-WDG3	• CLAMP, LOOP, CUSHIONED	2	
	B-6658-10	• SCREW, 10-32, FILLISTER HEAD	2	
	7931-3E1964-3	• DELETED	-	-
	3H2071	• BRUSH ASSEMBLY, MODULAR	2	
	7931-3E2071	• BRUSH ASSEMBLY, MODULAR, ALTERNATE FOR 3H2071	2	
	2H1212	• SHIM, BRUSH BLOCK	2	
	7931-2E1212	• SHIM, BRUSH BLOCK, ALTERNATE FOR 2H1212	2	
	4H1817-1	• BRACKET, BRUSH BLOCK	2	
	7931-4E1817-1	• BRACKET, BRUSH BLOCK, ALTERNATE FOR 4H1817-1	2	
	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
	B-3856-243	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
	B-3875-25A	• BOLT, 5/16-24, HEX HEAD	4	
	1H1211	• SPACER, E.P.D. SYSTEM (CE-320)	8	
	7931-1E1211	• SPACER, E.P.D. SYSTEM (CE-320), ALTERNATE FOR 1H1211	8	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit: 7931-67-940-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**7931-67-940-2 and 7931-67-940-3**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-940-3</b>	<b>AIRFRAME DE-ICE KIT W AC INSTALLATION INSTRUCTION 12N</b>		
	3H1951	• MOUNTING PLATE - SPLIT	2	
	7931-3E1951	• MOUNTING PLATE - SPLIT, ALTERNATE FOR 3H1951	2	
	4H2377-1	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E3477-1	1	
	7931-4E3477-1	• SLIP RING ASSEMBLY W/AC SUPERSEDED BY 4H2377-1	1	
	4H3422-1	• SLIP RING ASSEMBLY SUPERSEDES 7931-4E3422-1	1	
	7931-4E3422-1	• SLIP RING ASSEMBLY SUPERSEDED BY 4H3422-1	1	
	B-3869-3	• NUT, SELF-LOCKING, CRES	24	
	101131-10L	• WASHER, FLAT, REDUCED DIAMETER	24	Y
	B-3823	• SCREW, 10-32, CAP	24	
	B-3851-0363	• WASHER	2	Y
	B-3857-WDG3	• CLAMP, LOOP, CUSHIONED	2	
	B-6658-10	• SCREW, 10-32, FILLISTER HEAD	2	
	7931-3E1964-3	• DELETED	-	-
	3H2071	• BRUSH ASSEMBLY, MODULAR	2	
	7931-3E2071	• BRUSH ASSEMBLY, MODULAR, ALTERNATE FOR 3H2071	2	
	2H1212	• SHIM, BRUSH BLOCK	2	
	7931-2E1212	• SHIM, BRUSH BLOCK, ALTERNATE FOR 2H1212	2	
	4H1817-1	• BRACKET, BRUSH BLOCK	2	
	7931-4E1817-1	• BRACKET, BRUSH BLOCK, ALTERNATE FOR 4H1817-1	2	
	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
	B-3856-243	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
	B-3875-25A	• BOLT, 5/16-24, HEX HEAD	4	
	1H1211	• SPACER, E.P.D. SYSTEM (CE-320)	8	
	7931-1E1211	• SPACER, E.P.D. SYSTEM (CE-320), ALTERNATE FOR 1H1211	8	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit: 7931-67-940-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**7931-67-940-2 and 7931-67-940-3**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**7931-67-941-2**

O. Installation Instruction 12O

(1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

(a) 5E2663 Rev. L

1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)

b Hartzell Propeller Service Letter HC-SL-30-259

c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**7931-67-941-2**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-941-2</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 120</b>		
	4H3174	• MOUNTING PLATE	2	
	7931-4E3174	• MOUNTING PLATE, ALTERNATE FOR 4H3174	2	
	4H2267-1	• SLIP RING ASSEMBLY	1	
		SUPERSEDES 7931-4E2267-1		
	7931-4E2267-1	• SLIP RING ASSEMBLY	1	
		SUPERSEDED BY 4H2267-1		
	B-7076-42	• BELLEVILLE SPRING WASHER	6	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	6	
	B-3837-0432	• WASHER, CORROSION RESISTANT	6	Y
	B-3384-6H	• BOLT, 1/4-28, HEX HEAD	6	Y
	7931-3E1964-3	• DELETED	-	-
	3H2062-2	• MODULAR BRUSH BLOCK ASSEMBLY	1	
	7931-3E2062-2	• MODULAR BRUSH BLOCK ASSEMBLY, ALTERNATE FOR 3H2062-2	1	
	1H1157	• SHIM, BRUSH BLOCK ASS'Y	1	
	7931-1E1157	• SHIM, BRUSH BLOCK ASS'Y, ALTERNATE FOR 1H1157	1	
	3H1461	• BRACKET, MOUNTING, BRUSH BLOCK	1	
	7931-3E1461	• BRACKET, MOUNTING, BRUSH BLOCK, ALTERNATE FOR 3H1461	1	
	B-6655-08	• NUT, HEX, SELF-LOCKING	2	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
	B-6637-51	• SCREW, PAN HEAD, CRES	2	
	B-3875-25A	• BOLT, 5/16-24, HEX HEAD	2	
	1H1211	• SPACER, E.P.D. SYSTEM (CE-320)	4	
	7931-1E1211	• SPACER, E.P.D. SYSTEM (CE-320), ALTERNATE FOR 1H1211	4	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit: 7931-67-941-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**7931-67-942-2**

P. Installation Instruction 12P

(1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

(a) 5E2664 Rev. C

1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)

b Hartzell Propeller Service Letter HC-SL-30-259

c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**7931-67-942-2**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-942-2</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12P</b>		
	7931-389022-9	• AMMETER, 17-21 AMPS	1	
	3H1964-3	• TIMER DE-ICE	1	
	7931-3E1964-3	• TIMER, DE-ICE, ALTERNATE FOR 3H1964-3	1	
	3H2090-1	• MODULAR BRUSH BLOCK ASSEMBLY	2	
	7931-3E2090-1	• MODULAR BRUSH BLOCK ASSEMBLY, ALTERNATE FOR 3H2090-1	2	
	1H1157	• SHIM, BRUSH BLOCK ASS'Y	2	
	7931-1E1157	• SHIM, BRUSH BLOCK ASS'Y, ALTERNATE FOR 1H1157	2	
	7931-960115-1	• 101-960115-1 BRACKET	2	
	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	8	Y
	B-6637-50	• SCREW, PAN HEAD, CRES	4	
	7931-91586-1	• MS91586-1 AMMETER SHUNT 30 AMP	1	
	7931-7270-5-5	• SWITCH; CIRCUIT BREAKER	1	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit: 7931-67-942-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**102014-(2, 3, 4, 5) and 102195-2**

**Q. Installation Instruction 12Q**

- (1) Install the airframe de-ice kit components in accordance with the applicable aircraft TC or STC holder's ICA.

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>102014-2</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12Q</b>		
	3H3158-2	• WIRE HARNESS, SLIP RING	3	Y
	3H1389-1	• AMMETER, 29-33 AMPS	1	
	7931-91586-1	• MS91586-2 AMMETER SHUNT 50 AMP	1	
	B-6655-08	• NUT, HEX, SELF-LOCKING	2	
	B-3837-N832	• WASHER, CORROSION RESISTANT	2	Y
	B-6637-52	• SCREW, PAN HEAD, CRES	2	
	B-3864-38	• WASHER, LOCK	2	
	4H3076-3	• MOV MODULE - ASSEMBLY	1	
	<b>102014-3</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12Q</b>		
	102293	• WIRE HARNESS, SLIP RING	3	
	101856	• MOUNTING PLATE	2	
	101896	• SLIP RING ASSEMBLY	1	
	B-3808-3	• NUT, HEX, SELF-LOCKING	6	
	B-3837-0363	• WASHER, CORROSION RESISTANT	12	Y
	3H1389-2	• AMMETER, 29-33 AMPS	1	
	102052-6A	• BOLT, 1/4-28, HEX HEAD	6	
	3H2071	• MODULAR BRUSH BLOCK ASSEMBLY	1	
	2H1212	• SHIM, BRUSH BLOCK	2	
	101848	• BRACKET, MOUNTING, BRUSH BLOCK	1	
	B-3856-243	• SCREW, 8-32, FILISTER HEAD	2	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	2	
	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
	B-6637-52	• SCREW, PAN HEAD, CRES	2	
	101849	• SPACER	3	
	B-3864-38	• WASHER, LOCK	2	
	4H3076-3	• MOV MODULE - ASSEMBLY	1	
	B-3875-25A	• BOLT, 5/16-24, HEX HEAD	1	
	B-3875-22A	• BOLT, 5/16-24, HEX HEAD	1	
	7931-91586-1	• MS91586-2 AMMETER SHUNT 50 AMP	1	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit: 102014-2 and 102014-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**102014-(2, 3, 4, 5) and 102195-2**

**Q. Installation Instruction 12Q**

- (1) Install the airframe de-ice kit components in accordance with the applicable aircraft TC or STC holder's ICA.

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>102014-4</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12Q</b>		
	102293	• WIRE HARNESS, SLIP RING	3	
	101856	• MOUNTING PLATE	2	
	101896	• SLIP RING ASSEMBLY	1	
	B-3808-3	• NUT, HEX, SELF-LOCKING	6	
	B-3837-0363	• WASHER, CORROSION RESISTANT	12	Y
	102052-6A	• BOLT, 1/4-28, HEX HEAD	6	
	2H1212	• SHIM, BRUSH BLOCK	2	
	101848	• BRACKET, MOUNTING, BRUSH BLOCK	1	
	B-6655-08	• NUT, HEX, SELF-LOCKING	2	
	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
	101849	• SPACER	3	
	B-3864-38	• WASHER, LOCK	2	Y
	B-3875-25A	• BOLT, 5/16-24, HEX HEAD	1	
	B-3875-22A	• BOLT, 5/16-24, HEX HEAD	1	
	B-3856-243	• SCREW, 8-32, FILISTER HEAD	2	Y
	B-6637-52	• SCREW, PAN HEAD, CRES	2	
	<b>102014-5</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12Q</b>		
	101856	• MOUNTING PLATE	2	
	101896	• SLIP RING ASSEMBLY	1	
	B-3808-3	• NUT, HEX, SELF-LOCKING	6	
	B-3837-0363	• WASHER, CORROSION RESISTANT	12	Y
	102052-6A	• BOLT, 1/4-28, HEX HEAD	6	
	3H2071	• MODULAR BRUSH BLOCK ASSEMBLY	1	
	2H1212	• SHIM, BRUSH BLOCK	2	
	101848	• BRACKET, MOUNTING, BRUSH BLOCK	1	
	B-3856-243	• SCREW, 8-32, FILISTER HEAD	2	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	2	
	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
	B-6637-52	• SCREW, PAN HEAD, CRES	2	
	101849	• SPACER	3	
	B-3864-38	• WASHER, LOCK	2	
	4H3076-3	• MOV MODULE - ASSEMBLY	1	
	B-3875-25A	• BOLT, 5/16-24, HEX HEAD	1	
	B-3875-22A	• BOLT, 5/16-24, HEX HEAD	1	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit: 102014-4 and 102014-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**102014-(2, 3, 4, 5) and 102195-2**

**Q. Installation Instruction 12Q**

- (1) Install the airframe de-ice kit components in accordance with the applicable aircraft TC or STC holder's ICA.

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>102195-2</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12Q</b>		
	102337	• TIMER, DE-ICE	2	
	102395	• ELECTRICAL CONNECTOR	2	
	102354	• MODULAR BRUSH BLOCK ASSEMBLY	4	
	1H1157	• SHIM, BRUSH BLOCK ASS'Y	8	
	104044	• BRACKET, MOUNTING, BRUSH BLOCK	4	
	B-6655-08	• NUT, HEX, SELF-LOCKING	8	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	16	Y
	B-6637-50	• SCREW, PAN HEAD, CRES	8	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit: 102195-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

**102014-(2, 3, 4, 5) and 102195-2**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

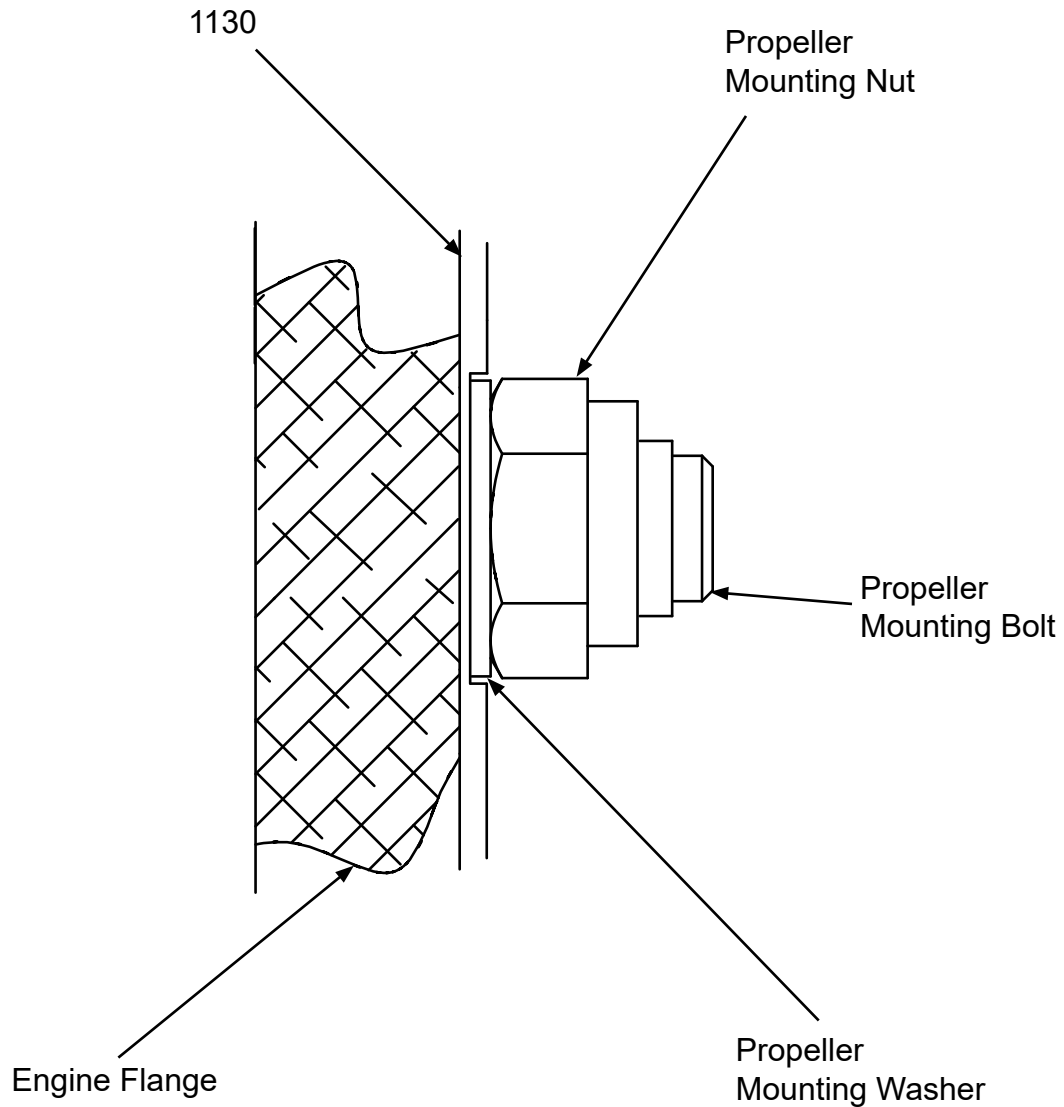
**102544-2**

R. Installation Instruction 12R

- (1) Using existing propeller mounting nuts and washers, attach the split mounting plate (1130) to the engine flange in accordance with Figure 12R-1.
  - (a) The split between the split mounting plates (3065) must be aligned with the propeller dowel pins.
  - (b) Torque the mounting nuts in accordance with the appropriate Hartzell Propeller Owner's Manual 115N (61-00-15).
- (2) Using tie strap or elastic band, secure the brushes inside the brush block assembly to prevent damage during installation of the slip ring assembly.
- (3) Using bolt (1350), washer (1200), belleville spring washer (1180), and nut (1190) attach the existing slip ring assembly to the split mounting plate (1130) in accordance with Figure 12R-2.
  - (a) Torque the bolts (1350) to 40 - 120 in-lbs. (4.5 - 14 N•m).
- (4) Perform the slip ring (1140) runout check in accordance with the Check chapter in this manual.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**102544-2**

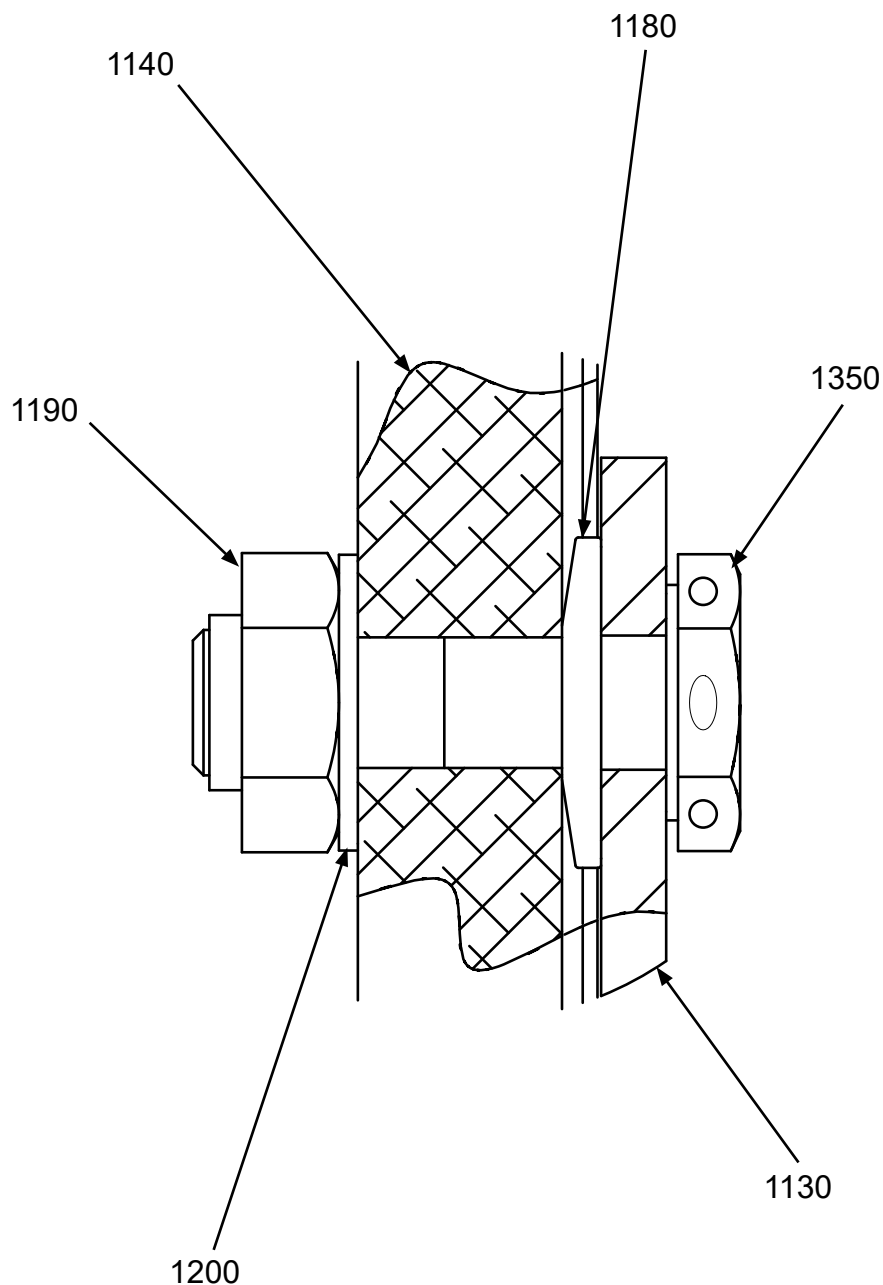


**Split Mounting Plate Attachment to Engine Flange  
Figure 12R-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

**102544-2**



**Slip Ring Assembly Mounting  
Figure 12R-2**

1500

This section includes the parts list(s) and installation instructions for the following airframe de-ice kit(s):

**102544-2**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	102544-2	AIRFRAME DE-ICE KIT W/OEM MCCAULEY DE-ICE INSTALLATION INSTRUCTION 10R FIGURES: 12R-1 and 12R-2		
1130	4H3174	• MOUNTING PLATE	2	
1180	B-7076-42	• BELLEVILLE SPRING WASHER	6	Y
1190	B-3808-4	• NUT, HEX, SELF-LOCKING	6	
1200	B-3837-0432	• WASHER, CORROSION RESISTANT	6	Y
1350	B-3384-6H	• BOLT, 1/4-28, HEX HEAD	6	Y

**- ITEM NOT ILLUSTRATED**

## Airframe De-ice Kit: 102544-2

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

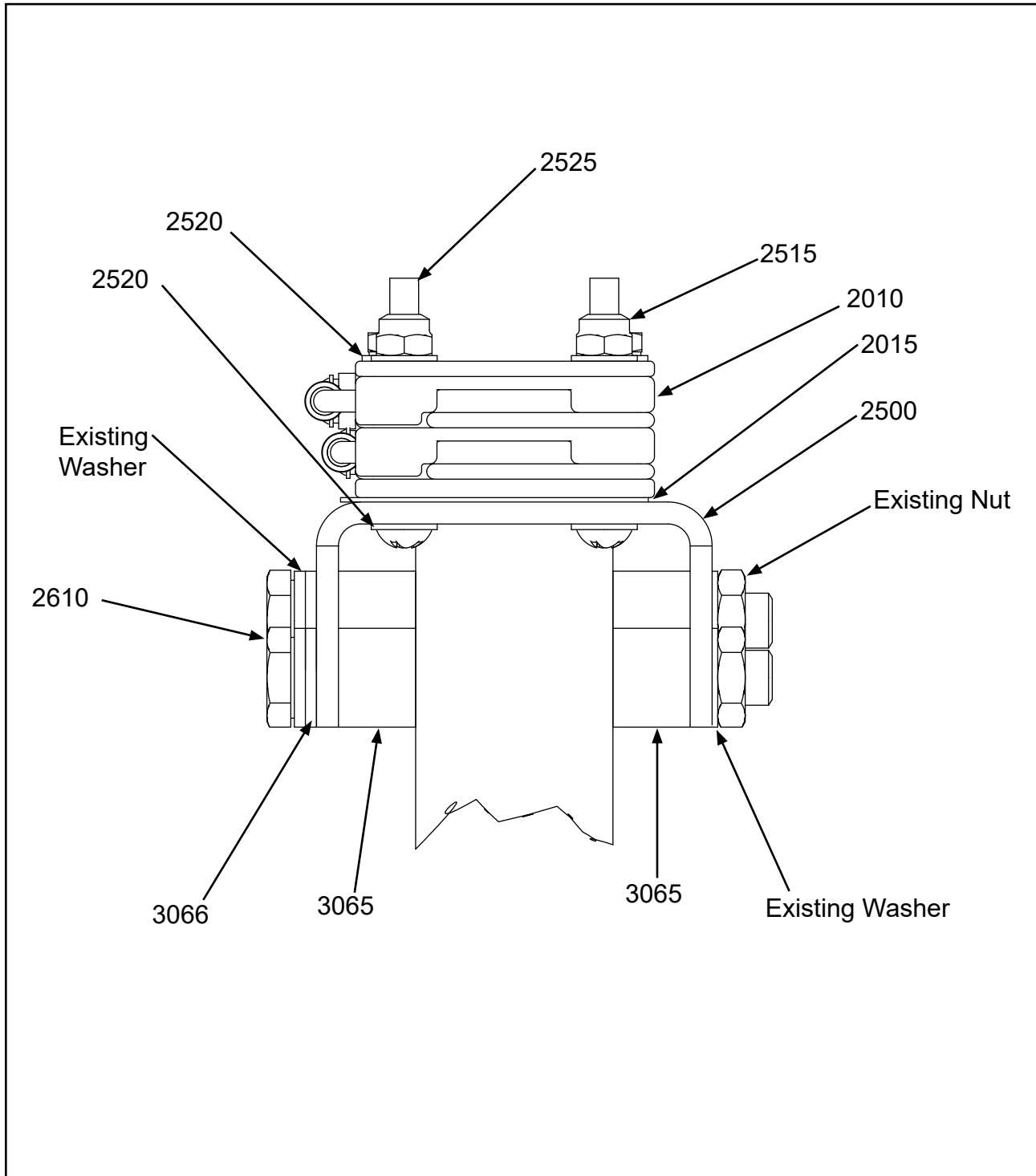
This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**102544-3**

**S.     Installation Instruction 12S**

- (1) Use existing washers, existing nut, and washers (3066) to attach the brush block bracket (2500) to the engine.
  - (a) Use the existing screws, washers and washer (3066) ensure proper grip length of bolt (2610).
  - (b) Torque each screw in accordance with the manufacturer's specification.
  - (c) Refer to Figure 12S-1.
- (2) Using existing propeller mounting nuts and washers, attach the split mounting plate (1130) to the engine flange in accordance with Figure 12S-2.
  - (a) The split between the split mounting plates (1130) must be aligned with the propeller dowel pins.
  - (b) Torque the mounting nuts in accordance with the applicable Hartzell Propeller Owner's Manual 115N (61-00-15).
- (3) Using the bolt (1350), washer (1200), belleville spring washer (1180), and nut (1190) attach the slip ring assembly (1140) to the split mounting plate (1130) in accordance with Figure 12S-3.
  - (a) Torque the bolts (1350) to 40 - 120 in-lbs. (4.5 - 14 N•m).
- (4) Perform the slip ring (1140) runout check in accordance with the instructions in the Check chapter of this manual.
- (5) Using screw (2525) washers (2520), and nuts (2515) attach the brush block assembly (2010) and shim (2015) to the brush block bracket (2500). Torque each nut to 12-15 in. lbs. (1.3-1.7 N•m). Refer to Figure 12S-1.
- (6) Align brush block assembly (2010) to the slip ring assembly in accordance with the instructions in the Assembly chapter of this manual.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**102544-3**

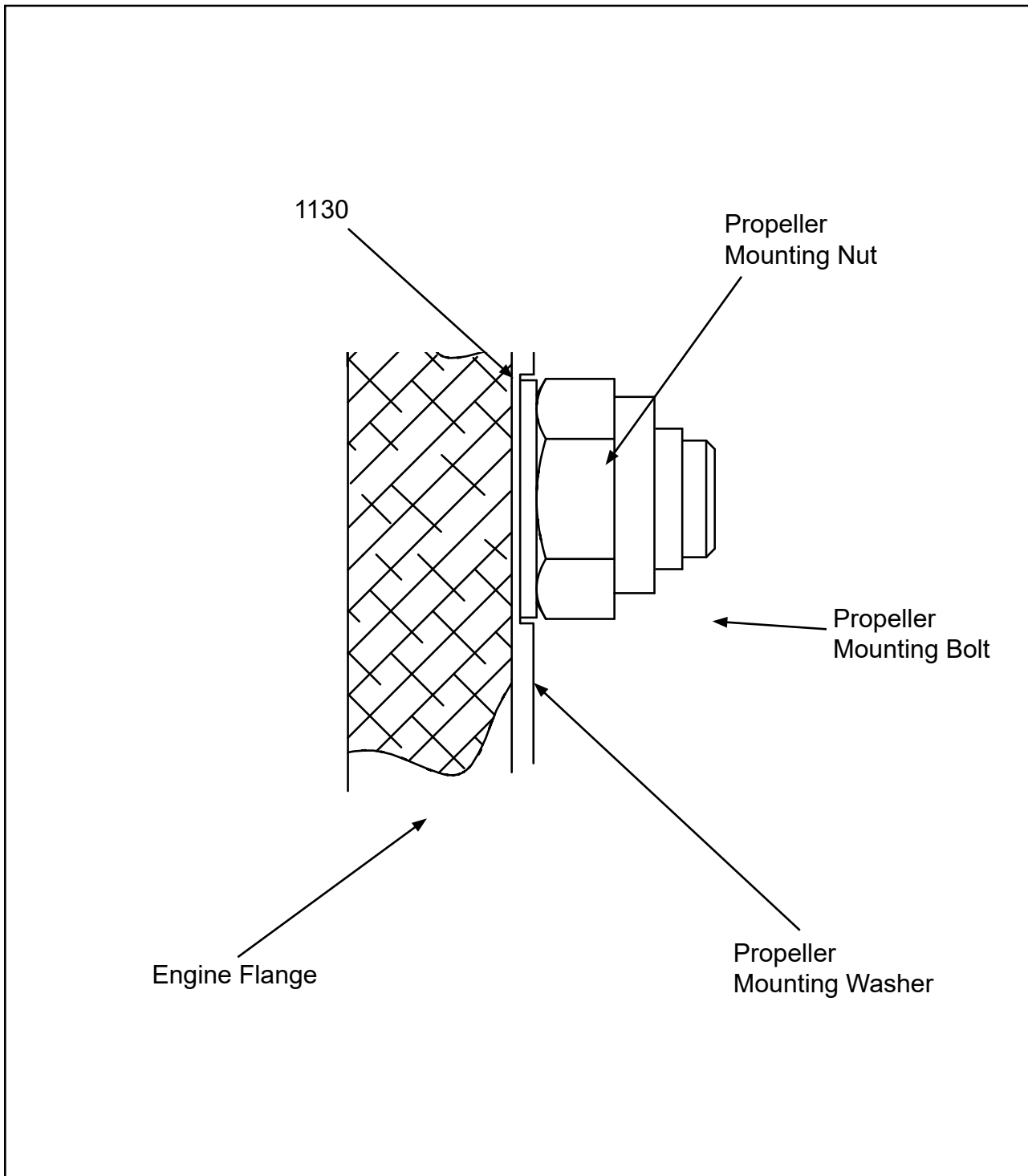


**Brush Block Installation  
Figure 12S-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

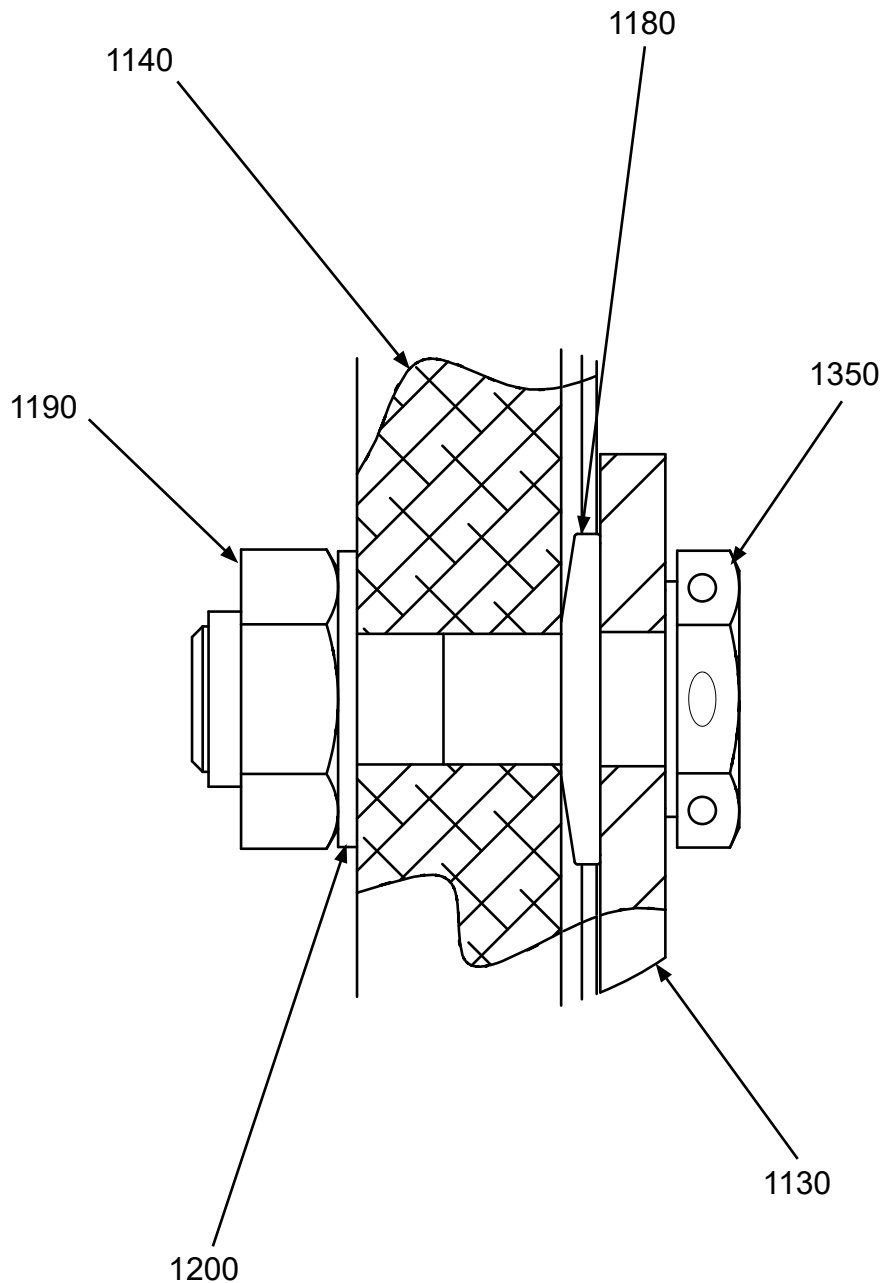
**102544-3**



**Split Mounting Plate Attachment to Engine Flange  
Figure 12S-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**102544-3**



**Slip Ring Assembly Mounting  
Figure 12S-3**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**102544-3**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>102544-3</b>	<b>AIRFRAME DE-ICE KIT W/OEM GOODRICH OR HARTZELL DE-ICE INSTALLATION INSTRUCTION 10S FIGURES 12S-1 thru 12S-3</b>		
1130	4H3174	• MOUNTING PLATE	2	
1140	4H2267-1	• SLIP RING ASSEMBLY	1	
1180	B-7076-42	• BELLEVILLE SPRING WASHER	6	Y
1190	B-3808-4	• NUT, HEX, SELF-LOCKING	6	
1200	B-3837-0432	• WASHER, CORROSION RESISTANT	6	Y
1350	B-3384-6H	• BOLT, 1/4-28, HEX HEAD	6	Y
2010	3H2062-2	• MODULAR BRUSH BLOCK ASSEMBLY	1	
2015	1H1157	• SHIM, BRUSH BLOCK ASS'Y	1	
2500	3H1461	• BRACKET, MOUNTING, BRUSH BLOCK	2	
2500A	7931-3E1461	• BRACKET, MOUNTING, BRUSH BLOCK, ALTERNATE FOR 3H1461	1	
2515	B-6655-08	• NUT, HEX, SELF-LOCKING	2	Y
2520	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
2525	B-6637-51	• SCREW, PAN HEAD, CRES	2	
2610	B-3875-25A	• BOLT, 5/16-24, HEX HEAD	2	
3065	7931-1E1211	• SPACER, E.P.D. SYSTEM (CE-320)	4	
3066	B-3837-0563	• WASHER, CORROSION RESISTANT	4	Y

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit: 102544-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

**102544-3**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

**102600-2**

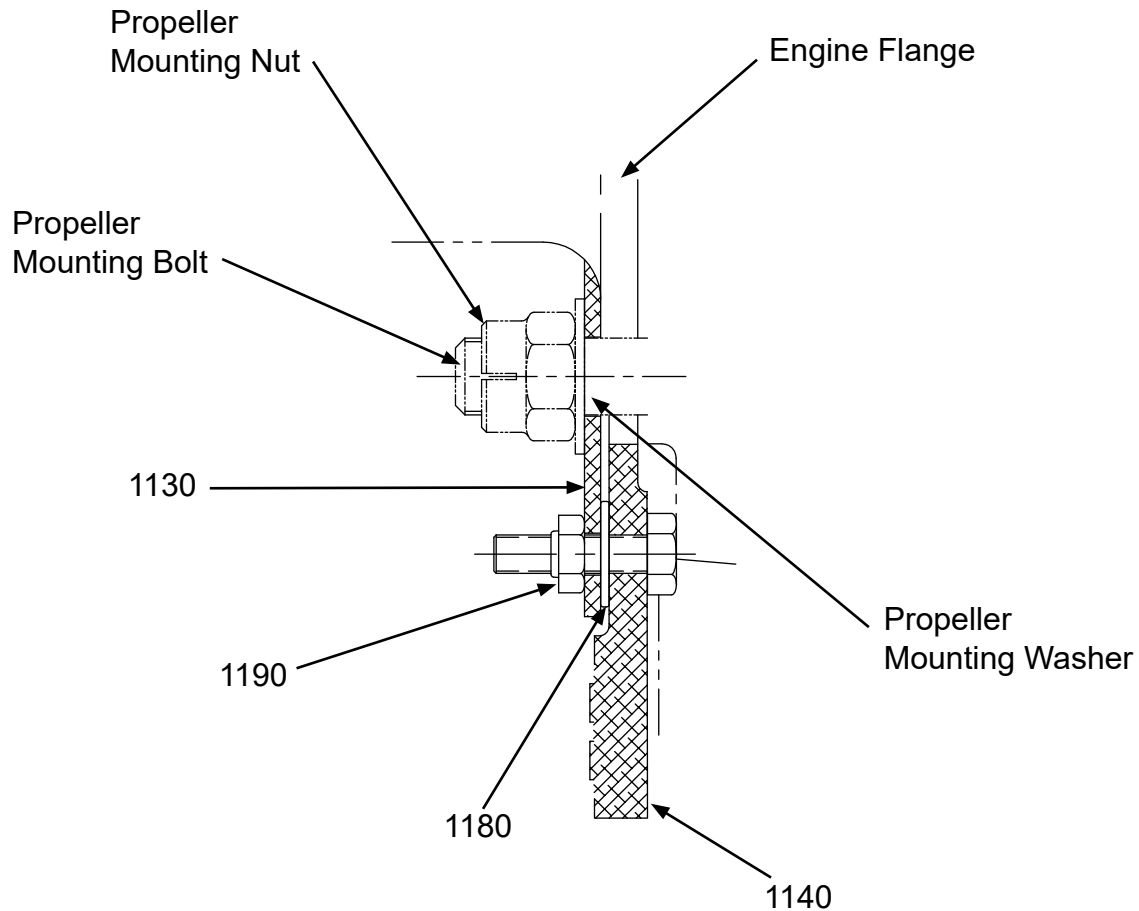
T. Installation Instruction 12T

- (1) Using the bolt on the slip ring assembly, belleville spring washer (1180), and nut (1190) attach the slip ring assembly (1140) to the split mounting plate (1130) in accordance with Figure 12T-1.
  - (a) Torque the bolts (1350) to 40 - 120 in-lbs. (4.5 - 14 N•m).
- (2) Using existing propeller mounting nuts and washers, attach the split mounting plate (1130) to the engine flange in accordance with Figure 12T-1 and Hartzell Propeller Owner's Manual 115N (61-00-15).
  - (a) The split between the split mounting plates (3065) must be aligned with the propeller dowel pins.
  - (b) Torque the mounting nuts in accordance with Hartzell Propeller Owner's Manual 115N (61-00-15).
- (3) Perform the slip ring (1140) runout check in accordance with the instructions in the Check chapter of this manual.
- (4) Using screw (2525), washers (2520), and nuts (2515) attach the brush block assembly (2010) and shim (2015) to the existing brush block bracket. Torque each nut to 12-15 in. lbs. (1.3-1.7 N•m). Refer to Figure 12T-2.
- (5) Align brush block assembly (2010) to the slip ring assembly in accordance with the instructions in the Assembly chapter of this manual.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

**102600-2**

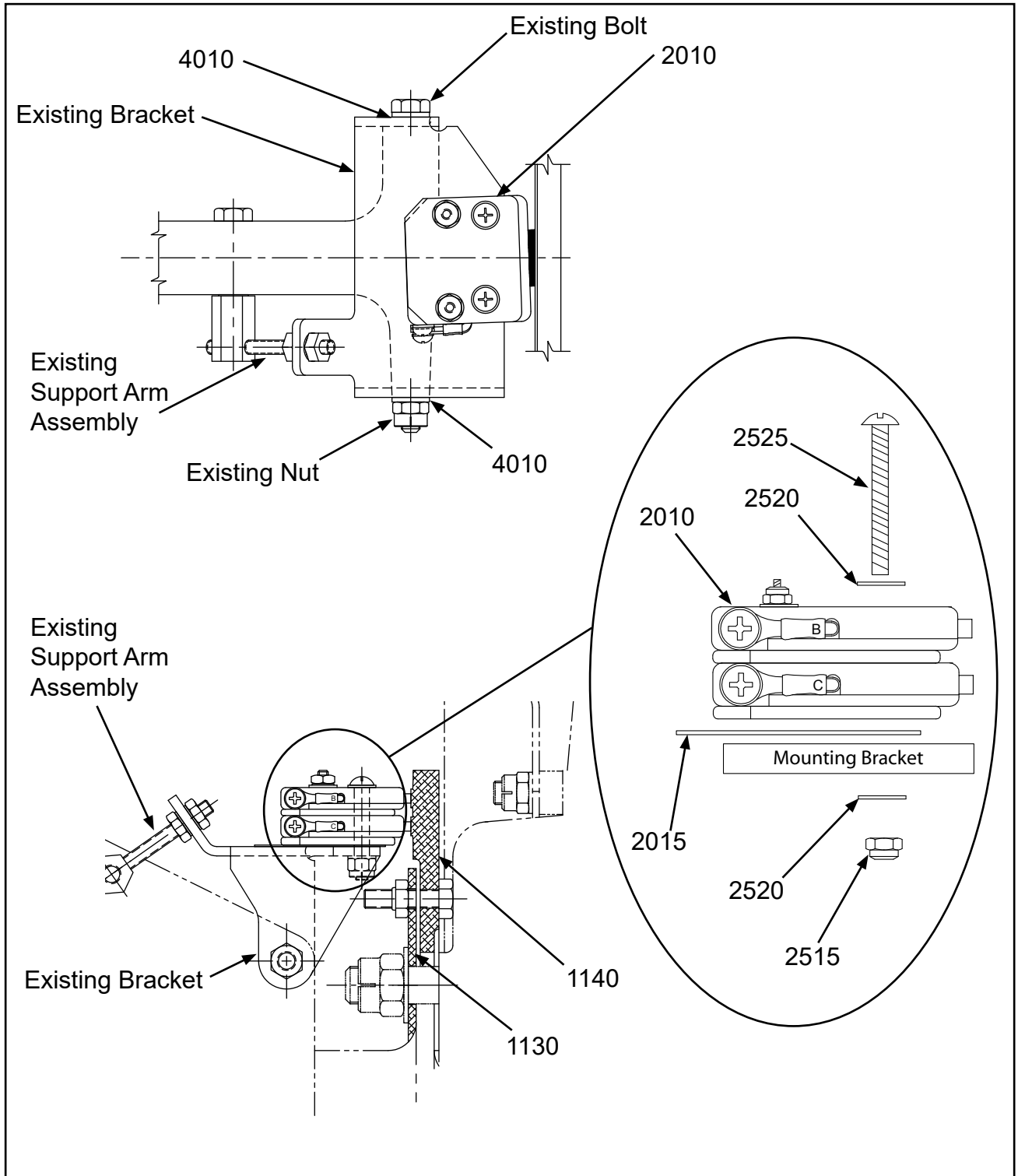


**Split Mounting Plate and Slip Ring Assembly Attachment to Engine Flange  
Figure 12T-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

**102600-2**



**Brush Block Installation  
Figure 12T-2**

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

## 102600-2

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>102600-2</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 10T FIGURES: 12T-1 and 12T-2</b>		
-1220	3H1389-7	• AMMETER, 29-33 AMPS	1	
3000	7931-91586-2	• MS91586-2 AMMETER SHUNT 50 AMP	1	
3020	7931-454-724	• 454-724 CIRCUIT BREAKER, 35 AMP	1	
1560	3H1964-3	• TIMER DE-ICE	1	
1560A	7931-3E1964-3	• TIMER, DE-ICE, ALTERNATE FOR ITEM 1560	1	
1130	4H3153	• MOUNTING PLATE, SPLIT	4	
1140	4H2422	• SLIP RING ASSEMBLY	2	
1180	B-7077-52	• BELLEVILLE SPRING WASHER	12	Y
1190	B-3808-4	• NUT, HEX, SELF-LOCKING	12	
2010	3H2062-2	• MODULAR BRUSH BLOCK ASSEMBLY	2	
2015	1H1157	• SHIM, BRUSH BLOCK ASS'Y	2	
2515	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
2520	B-3837-N832	• WASHER, CORROSION RESISTANT	8	Y
2525	B-6637-50	• SCREW, PAN HEAD, CRES	4	
4010	B-3837-0463	• WASHER, CORROSION RESISTANT	12	Y
<b>NOTE 1</b>				
-	32370-11	• SWITCH, ILLUM, ROCKER (PIPER)	1	
-	B-3874-42A	• BOLT, 1/4-28, HEX HEAD	2	
-	3E1935	• SUPPORT ARM ASSEMBLY	2	
-	4E2032	• BRUSH BLOCK BRACKET	2	
		<b>NOTE 1:</b> Existing parts installed. Part numbers are supplied for replacement purposes only.		

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit: 102600-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

**102960-2**

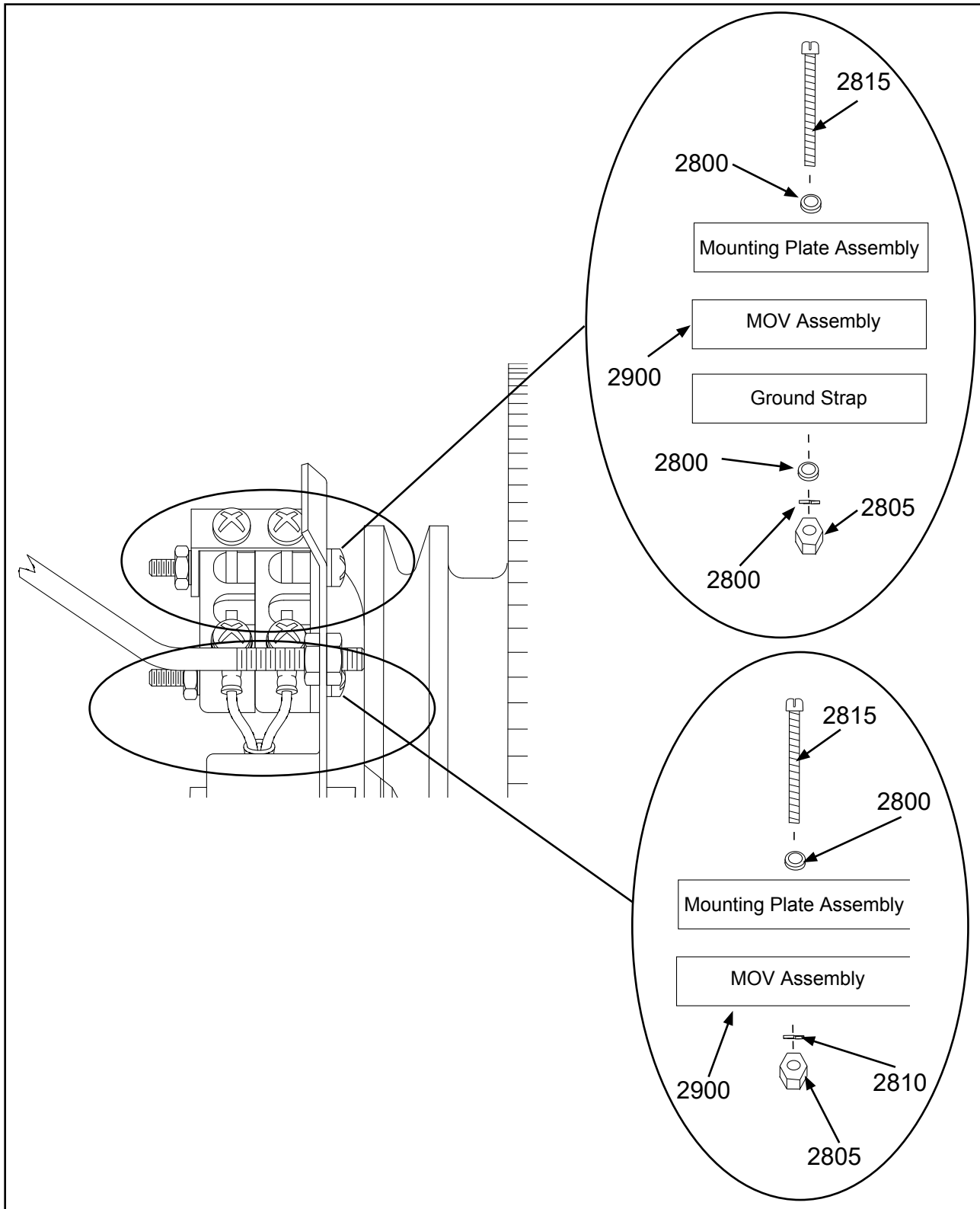
U. Installation Instruction 12U

- (1) Install the ammeter (1220) in accordance with the airframe manufacturer's specification or applicable STC installation instructions.
- (2) Using the nuts (2805), screw (2815), washer (2800), and lock washer (2820), attach the MOV Module (2900) the aircraft mounting plate assembly in accordance with Figure 12U-1.
- (3) Align brush block assembly (2010) to the slip ring assembly in accordance with the instructions in the Assembly chapter of this manual.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

**102960-2**




**MOV Installation  
Figure 12U-1**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

**102960-2**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>102960-2</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 10U FIGURES: 12U-1</b>		
 -1220	3H1389-2	• AMMETER, 14-18 AMPS	1	
2800	B-3837-N832	• WASHER, CORROSION RESISTANT	2	Y
2805	B-6655-08	• NUT, HEX, SELF-LOCKING	2	Y
2810	B-3854-42	• WASHER, LOCK	2	Y
2815	B-6637-51	• SCREW, PAN HEAD, CRES	2	
2900	4H3076-1	• MOV MODULE - ASSEMBLY	1	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit: 102960-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

**102960-2**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

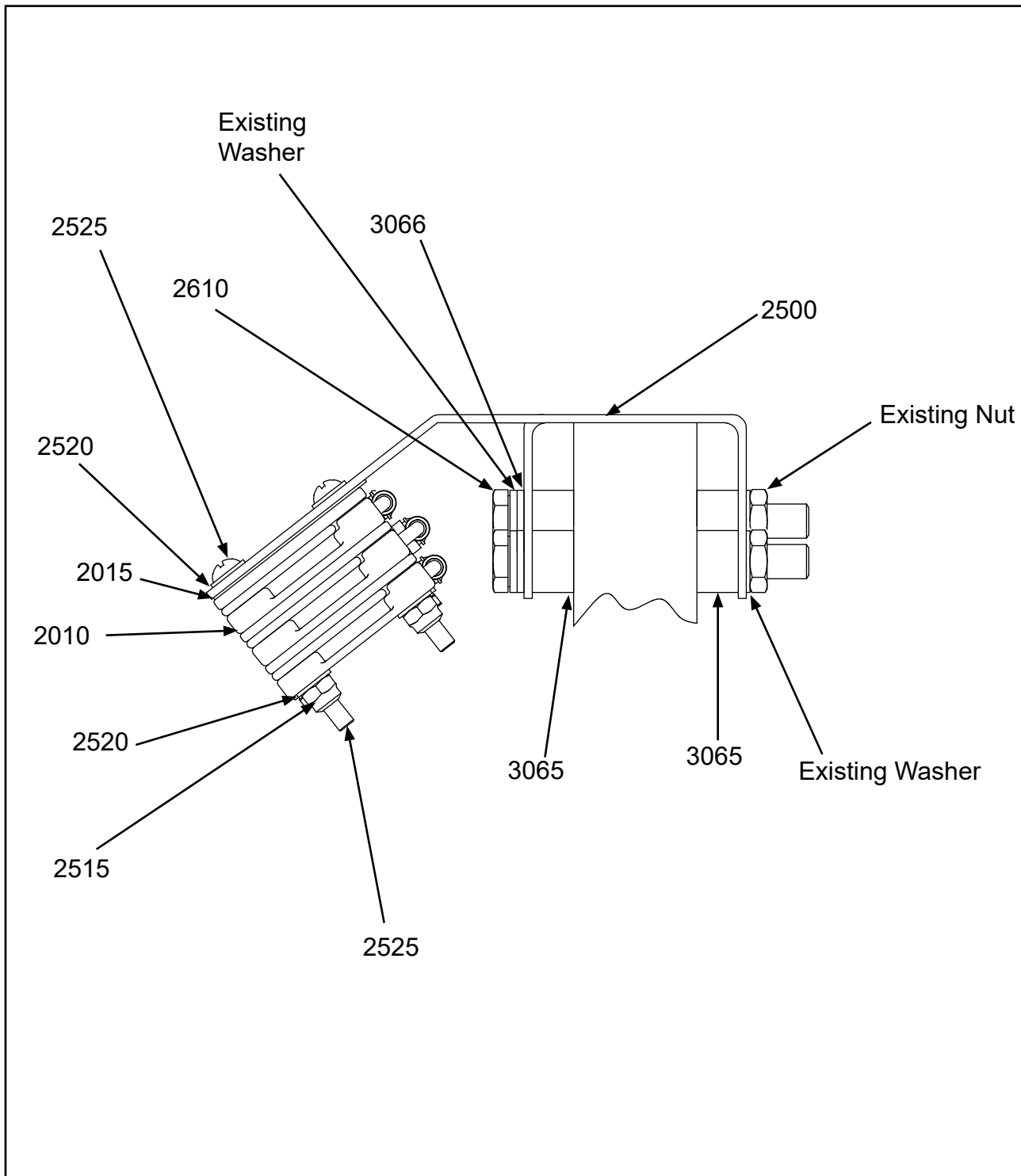
This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**102998-2 and 103307**

V. Installation Instruction 12V

- (1) Use bolt (2610), existing washers, existing nut, spacers (3065), and washers (3066) to attach the brush block bracket to the engine.
  - (a) Use the existing screws, washers, spacers (3065), and washer (3066), as required, to ensure proper grip length of bolt (2610).
  - (b) Snug each screw in accordance with the manufacturer's specification.
  - (c) Refer to Figure 12V-1.
- (2) Using existing propeller mounting nuts and washers, attach the split mounting plate (1130) to the engine flange in accordance with Figure 12V-2.
  - (a) The split between the split mounting plates (3065) must be aligned with the propeller dowel pins.
  - (b) Torque mounting nuts in accordance with the applicable Hartzell Propeller Owner's Manual 115N (61-00-15).
- (3) Using bolt (1350), washer (1200), belleville spring washer (1180), and nut (1190) attach the slip ring assembly (1140) to the split mounting plate (1130) in accordance with Figure 12V-3.
  - (a) Align the slip ring assembly (1140) to the split mounting plates (1130) so the terminal studs are between blades.
  - (b) Torque the nuts (1350) 40 - 120 in-lbs. (4.5 - 14 N•m).
- (4) Perform the slip ring (1140) runout check in accordance with the instructions in the Check chapter of this manual..
- (5) Remove brush retention band and align the brush block assembly (2010) to the slip ring assembly in accordance with the instructions in the Assembly chapter of this manual.
- (6) Torque each bolt in accordance with the manufacturer's specification.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**102998-2 and 103307**

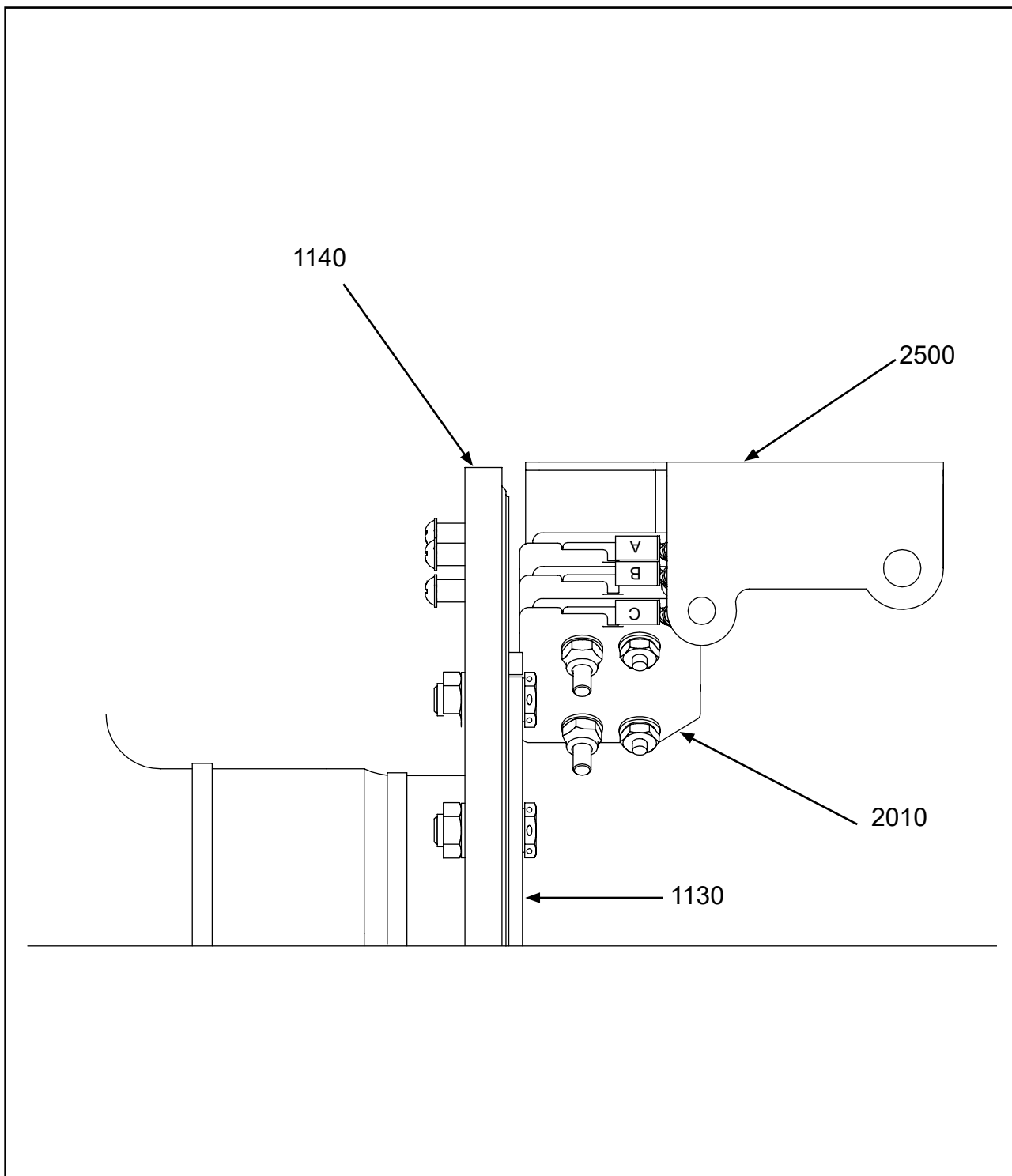


**Brush Block Installation**  
**Figure 12V-1, page 1 of 2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

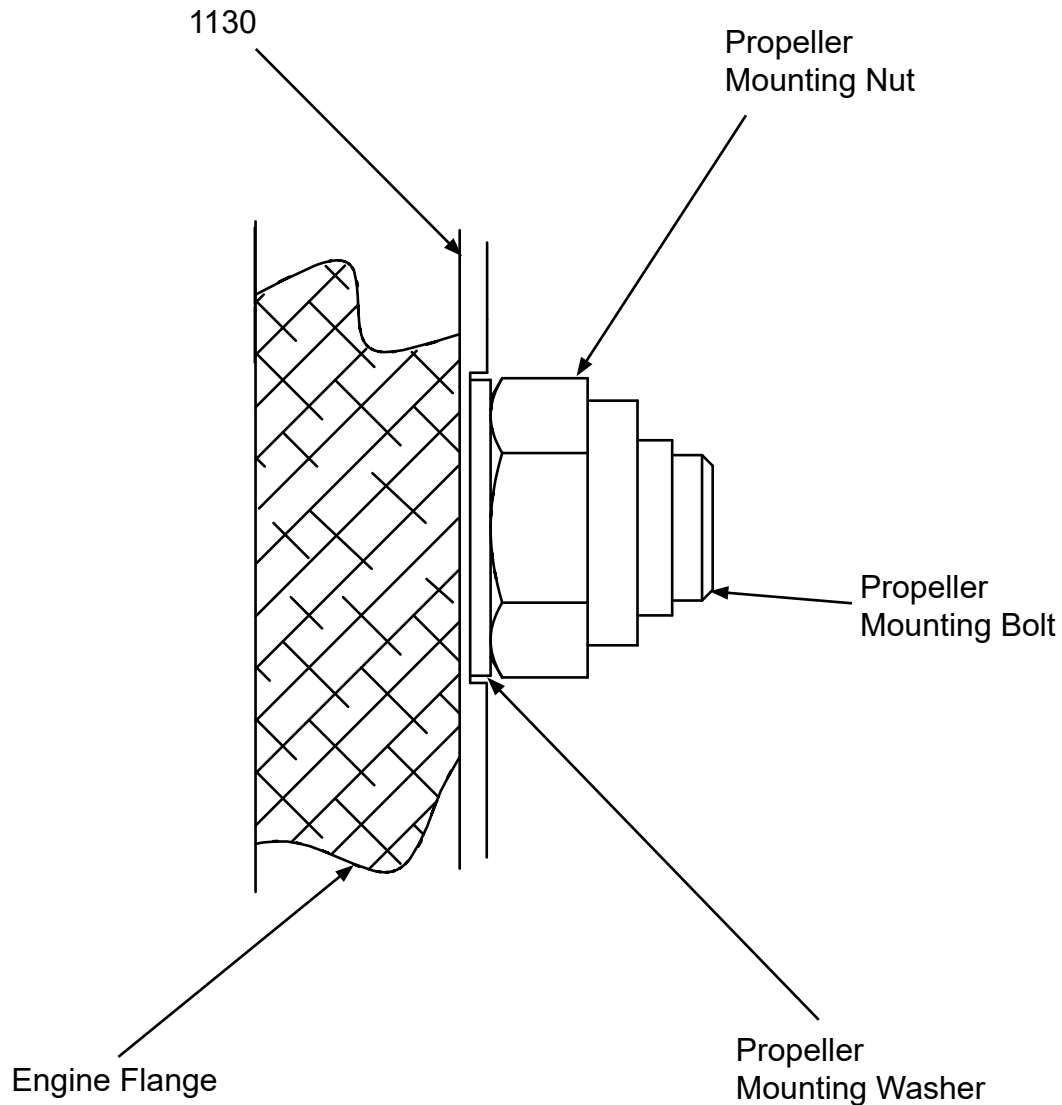
**102998-2 and 103307**



**Brush Block Installation  
Figure 12V-1, page 2 of 2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**102998-2 and 103307**

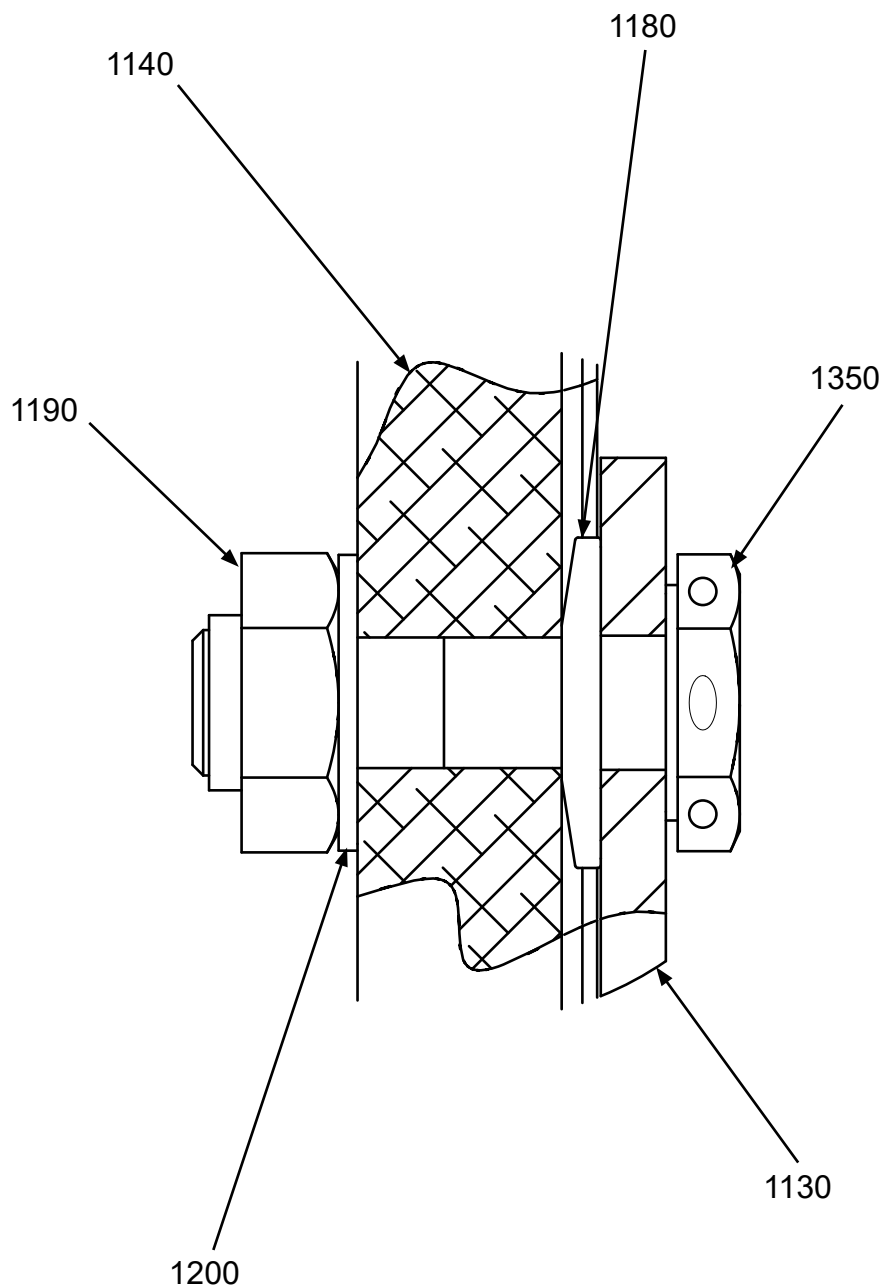


**Split Mounting Plate Attachment to Engine Flange**  
**Figure 12V-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

**102998-2 and 103307**



**Slip Ring Assembly Mounting  
Figure 12V-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**102998-2 and 103307**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>102998-2</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 10V FIGURES: 12V-1 thru 12V-3</b>		
1130	4H3174	• MOUNTING PLATE	2	
1140	4H2459-2	• SLIP RING ASSEMBLY	1	
1180	B-7077-52	• BELLEVILLE SPRING WASHER	6	Y
1190	B-3808-4	• NUT, HEX, SELF-LOCKING	6	
1200	B-3837-0432	• WASHER, CORROSION RESISTANT	6	Y
1350	B-3384-7H	• BOLT, 1/4-28, HEX HEAD	6	Y
2010	103158	• MODULAR BRUSH BLOCK ASSEMBLY	1	
2015	1H1157	• SHIM, BRUSH BLOCK ASS'Y	1	
2015A	7931-1E1157	• SHIM, BRUSH BLOCK ASS'Y, ALTERNATE FOR 1H1157	1	
2500	3H2581-2	• BRACKET, MOUNTING, BRUSH BLOCK	1	
2500A	7931-3E2581-2	• BRACKET, MOUNTING, BRUSH BLOCK, ALTERNATE FOR 3H2581-2	1	
2515	B-6655-08	• NUT, HEX, SELF-LOCKING	2	Y
2520	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
2525	B-6637-52	• SCREW, PAN HEAD, CRES	2	
2610	B-3875-25A	• BOLT, 5/16-24, HEX HEAD	2	
3065	1H1211	• SPACER, E.P.D. SYSTEM	4	
3065A	7931-1E1211	• SPACER, E.P.D. SYSTEM, ALTERNATE	4	
3066	B-3837-0563	• WASHER, CORROSION RESISTANT	4	Y
895	3H1452	• WIRE HARNESS, SLIP RING	3	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit: 102998-2**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

**102998-2 and 103307**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>103307</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 10V FIGURES: 12V-1 thru 12V-3</b>		
1130	4H3174	• MOUNTING PLATE	2	
1140	4H2459-2	• SLIP RING ASSEMBLY	1	
1180	B-7077-52	• BELLEVILLE SPRING WASHER	6	Y
1190	B-3808-4	• NUT, HEX, SELF-LOCKING	6	
1200	B-3837-0432	• WASHER, CORROSION RESISTANT	6	Y
1350	B-3384-7H	• BOLT, 1/4-28, HEX HEAD	6	Y
2010	103158	• MODULAR BRUSH BLOCK ASSEMBLY	1	
2015	1H1157	• SHIM, BRUSH BLOCK ASS'Y	1	
2500	3H2581-2	• BRACKET, MOUNTING, BRUSH BLOCK	1	
2515	B-6655-08	• NUT, HEX, SELF-LOCKING	2	Y
2520	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
2525	B-6637-52	• SCREW, PAN HEAD, CRES	2	
2610	B-3875-25A	• BOLT, 5/16-24, HEX HEAD	2	
3065	1H1211	• SPACER, E.P.D. SYSTEM	4	
3066	B-3837-0563	• WASHER, CORROSION RESISTANT	4	Y

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit: 103307**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**102998-2 and 103307**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

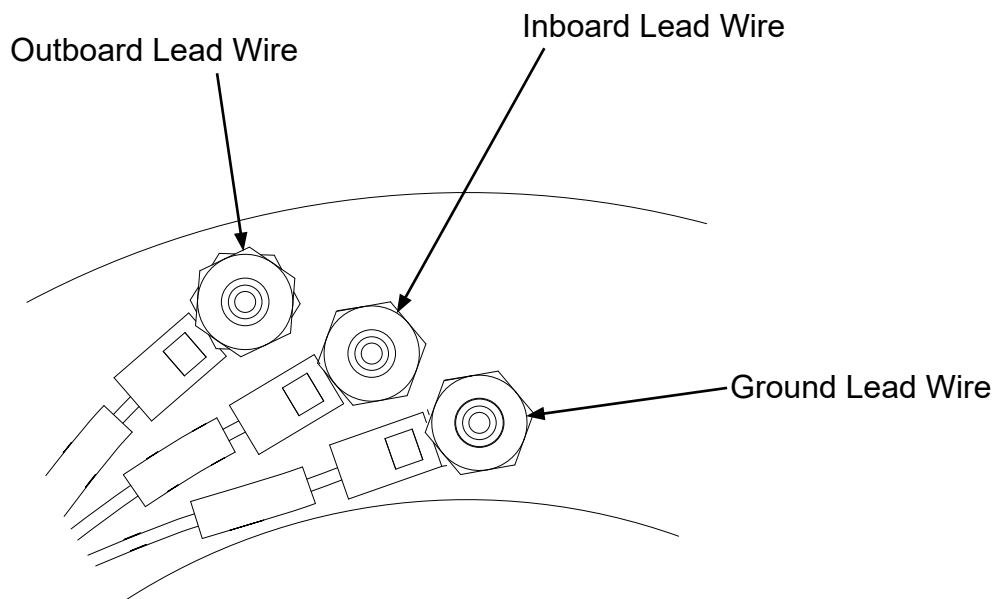
This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**102998-3 and 103308**

W. Installation Instruction 12W

- (1) Using the hardware supplied with the slip ring assembly, install the terminal ends of the slip ring wire harness (895) onto the terminal studs of the slip ring as shown in Figure 12W-1.
  - (a) Torque the screw to 10-12 In.-Lbs (1.1-1.3 N•m).
- (2) Using the tie straps supplied with the propeller de-ice kit, attach the slip ring wire harness (895) to the hub as shown in Figure 12W-2.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**102998-3 and 103308**

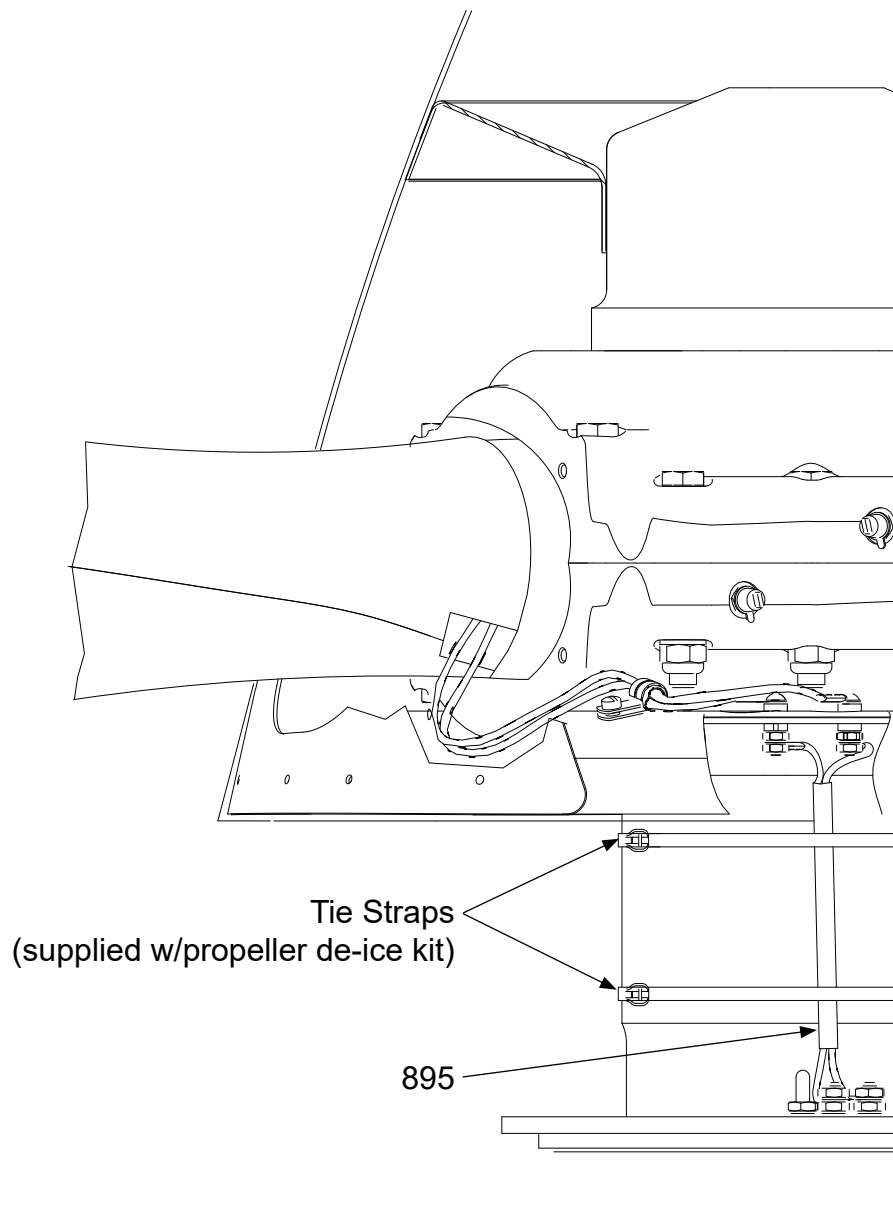


**Slip Ring Wire Harness Attachment to Slip Ring  
Figure 12W-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

**102998-3 and 103308**



**Securing Slip Ring Lead Wire or Wire Harness to Hub  
Figure 12W-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**102998-3 and 103308**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
895	102998-3 102451	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12W FIGURES: 12W-1 and 12W-2</b> • WIRE HARNESS, SLIP RING	3	
895	103308 102451	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12W FIGURES: 12W-1 and 12W-2</b> • WIRE HARNESS, SLIP RING	3	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit: 102998-3 and 103308**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

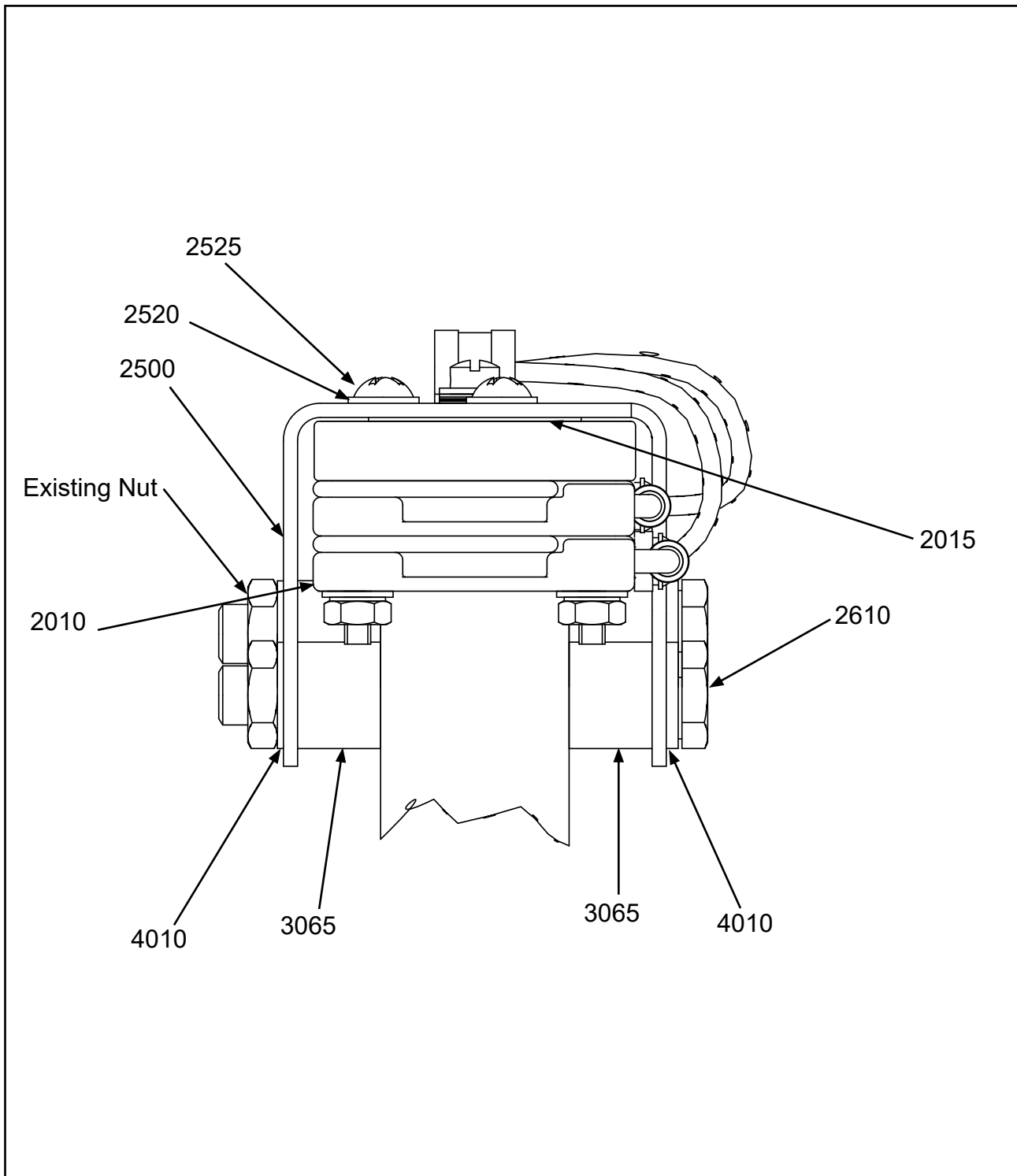
This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**103294-(4, 5)**

**X. Installation Instruction 12X**

- (1) Use bolt (2610), washers (4010), spacers (3065), washers (3066), existing washers, and existing nut to attach the brush block bracket to the engine.
  - (a) Use the existing washers and washers (4010), as required, to ensure proper grip length of bolt (2610).
  - (b) Snug each bolt.
  - (c) Refer to Figure 10W-1.
- (2) Using screw (2525) and washers (2520) attach the brush block assembly (2010) and shim (2015) to the brush block bracket (2500). Torque each nut to 12-15 in. lbs. (1.3-1.7 N•m). Refer to Figure 12X-1.
- (3) Install the clamp (1370) around the airframe de-ice wire harness. Refer to Figure 12X-2.
- (4) Using screw (1380) and washer (1360) attach the clamp (1370) to the brush block bracket (2500).
- (5) Torque the screw (1380) to 22 - 25 in-lbs. (2.4 - 2.8 N•m).
- (6) Attach the airframe de-ice wire harness to the brush block (2010).
- (7) Put the split mounting plates on aft side of the engine flange. Refer to Figure 12X-2.
- (8) Using the screw (1350), washer (1200), and nut (1190) attach the slip ring assembly (1140) to the split mounting plate (1130) in accordance with Figure 12X-2.
  - (a) Torque the screw (1350) to 40 - 120 in-lbs. (4.5 - 14 N•m).
- (9) Install the propeller in accordance with Hartzell Propeller Owner's Manual 115N (61-00-15).
- (10) Using existing propeller mounting nuts and washers, attach the split mounting plate (1130) to the engine flange in accordance with Figure 12X-2.
  - (a) The split between the split mounting plates (1130) must be aligned with the propeller dowel pins.
  - (b) Torque the mounting nuts in accordance with Hartzell Propeller Owner's Manual 115N (61-00-15).
- (11) Perform the slip ring (1140) runout check in accordance with the instructions in the Check chapter of this manual.
- (12) Remove the brush retention band and align the brush block assembly (2010) to the slip ring assembly in accordance with the instructions in the Assembly chapter of this manual.
- (13) Torque each bolt in accordance with the manufacturer's specification.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**103294-(4, 5)**

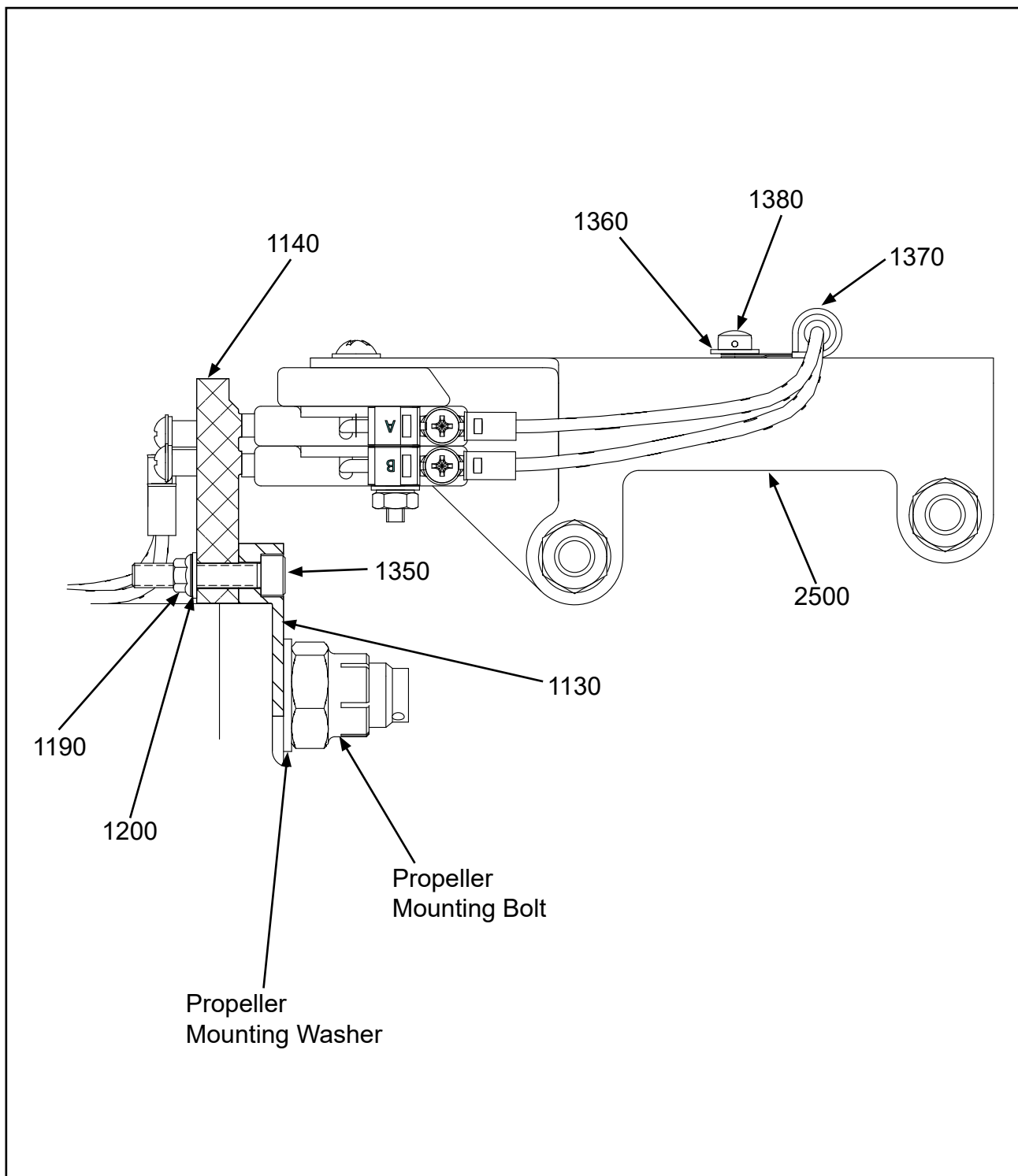


**Brush Block Installation  
Figure 12X-1**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**103294-(4, 5)**



**Brush Block Installation  
Figure 12X-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**103294-(4, 5)**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>103294-4</b>	<b>AIRFRAME DE-ICE KIT, NO A/C AND REPLACING A MCCAULEY PROPELLER INSTALLATION INSTRUCTION 12X FIGURES: 12X-1 and 12X-2</b>		
1130	3H1951	• MOUNTING PLATE - SPLIT	2	
1140	4H3422-1	• SLIP RING ASSEMBLY	2	
1190	B-3869-3	• NUT, SELF-LOCKING, CRES	24	
1200	101131-10L	• WASHER, FLAT, REDUCED DIAMETER	24	Y
1350	B-6606-16P	• SCREW, 10-32, CAP	24	
1360	B-3851-0363	• WASHER	2	Y
1370	B-3857-WDG3	• CLAMP, LOOP, CUSHIONED	2	
1380	B-6658-10	• SCREW, 10-32, FILLISTER HEAD	2	
2010	3H2071	• BRUSH ASSEMBLY, MODULAR	2	
2015	2H1212	• SHIM, BRUSH BLOCK	2	
2500	4H1817-1	• BRACKET, BRUSH BLOCK	2	
2520	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
2525	B-3856-243	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
2610	B-3875-25A	• BOLT, 5/16-24, HEX HEAD	4	
3065	1H1211	• SPACER, E.P.D. SYSTEM (CE-320)	8	
4010	B-3851-0532	• WASHER	4	Y

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit: 103294-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**103294-(4, 5)**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>103294-5</b>	<b>AIRFRAME DE-ICE KIT, WITH A/C AND REPLACING A MCCAULEY PROPELLER INSTALLATION INSTRUCTION 12X FIGURES: 12X-1 and 12X-2</b>		
1130	3H1951	• MOUNTING PLATE - SPLIT	2	
1140	4H3422-1	• SLIP RING ASSEMBLY	1	
1140A	4H2377-1	• SLIP RING ASSEMBLY	1	
1190	B-3869-3	• NUT, SELF-LOCKING, CRES	24	
1200	101131-10L	• WASHER, FLAT, REDUCED DIAMETER	24	Y
1350	B-6606-16P	• SCREW, 10-32, CAP	24	
1360	B-3851-0363	• WASHER	2	Y
1370	B-3857-WDG3	• CLAMP, LOOP, CUSHIONED	2	
1380	B-6658-10	• SCREW, 10-32, FILLISTER HEAD	2	
2010	3H2071	• BRUSH ASSEMBLY, MODULAR	2	
2015	2H1212	• SHIM, BRUSH BLOCK	2	
2500	4H1817-1	• BRACKET, BRUSH BLOCK	2	
2520	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
2525	B-3856-243	• SCREW, 8-32, FILLISTER HEAD, CRES	4	Y
2610	B-3875-25A	• BOLT, 5/16-24, HEX HEAD	4	
3065	1H1211	• SPACER, E.P.D. SYSTEM (CE-320)	8	
4010	B-3851-0532	• WASHER	4	Y

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit: 103294-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**103294-(4, 5)**

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# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**103643 and 103644**

## Y. Installation Instruction 12Y

- (1) Install the airframe de-ice kit components in accordance with the applicable aircraft TC or STC holder's ICA.

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>103643</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12Y</b>		
	3H2044-1	• MODULAR BRUSH BLOCK ASSEMBLY	2	
	1H1157	• SHIM, BRUSH BLOCK ASS'Y	2	
	103556	• BRUSH BLOCK BRACKET	2	
	B-6655-08	• NUT, HEX, SELF-LOCKING	4	
	B-3837-N832	• WASHER, CORROSION RESISTANT	8	Y
	B-3384-4H	• BOLT, 1/4-28, HEX HEAD	4	Y
	B-3837-0432	• WASHER, CORROSION RESISTANT	4	Y
	B-3808-4	• NUT, SELF-LOCKING	4	Y
	B-6637-52	• SCREW, PAN HEAD, CRESCENT	4	Y
	103557	• PLATE BASE	1	
	103402	• TIMER/MONITOR	1	
	<b>103644</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12Y</b>		
	103044	• BRACKET, MOUNTING, BRUSH BLOCK	1	
	3H2090-1	• MODULAR BRUSH BLOCK ASSEMBLY	1	
	1H1157	• SHIM, BRUSH BLOCK	2	
	B-66337-N832	• WASHER, CORROSION RESISTANT	4	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	2	Y
	1N4004	• DIODE	1	
	103818	• POWER RELAY ASSEMBLY	1	
	S-1232-540	• CIRCUIT BREAKER	1	
	3H1872-4	• AMMETER, 27-33 AMPS		

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit: 103643 and 103644**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**103643 and 103644**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

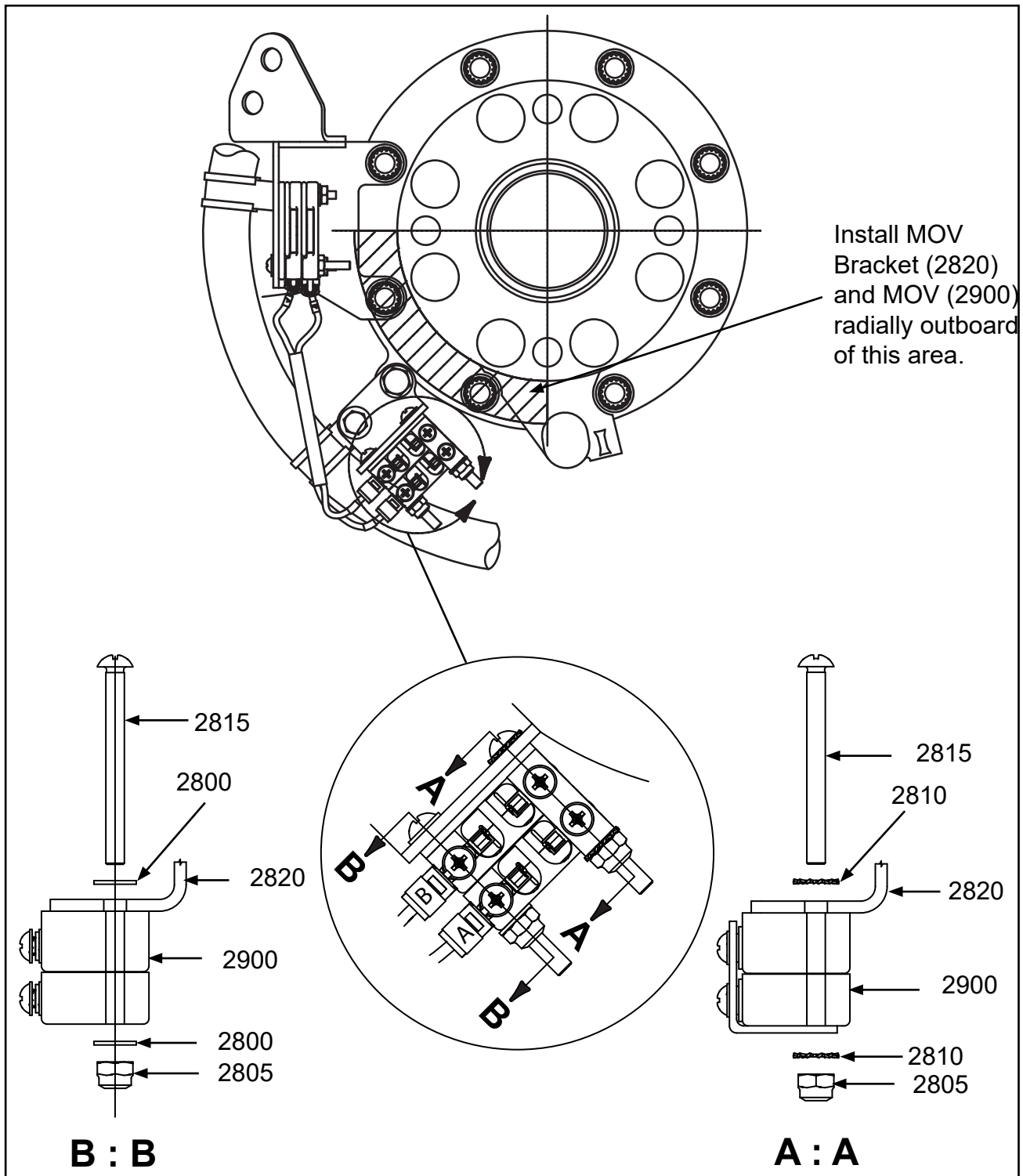
This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**103652**

**Z. Installation Instruction 12Z**

- (1) Attach MOV Module (2900) "A" wire to "B" brush block terminal (outboard).
- (2) Attach MOV Module (2900) "B" wire to "C" brush block terminal (inboard).
- (3) Using the nut (2805), screw (2815), washer (2800 or 2810), and lock washer (2810), attach the MOV Module (2900) to the MOV bracket (2820).
- (4) Torque the screw (2815) to 22 - 25 in-lbs. (2.4 - 2.8 N•m).
- (5) Attach the MOV bracket (2820) to the aircraft mounting plate assembly radially outboard of the area shown in Figure 12Z-1.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**103652**



**MOV Installation  
Figure 12Z-1**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**103652**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>103652</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12Z FIGURE: 12Z-1</b>		
2900	4H3076-3	• MOV MODULAR - ASSEMBLY	1	
2820	103648	• BRACKET, MOV	1	
2815	B-6637-52	• SCREW, PAN HEAD, CRES.	2	
2800	B-3837-N832	• WASHER, CORROSION RESISTANT	2	Y
2810	B-3855-31	• WASHER, LOCK, EXTERNAL TOOTH	2	Y
2805	B-6655-08	• NUT, HEX, SELF-LOCKING	2	Y

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit: 103652**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**103652**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

**104009 and 104128**

**AA. Installation Instruction 12AA**

- (1) Install the airframe de-ice kit components in accordance with the applicable aircraft TC or STC holder's ICA.

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>104009</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12AA</b>		
	103980	• BRACKET, MOUNTING, BRUSH BLOCK	1	
	3H2090-1	• MODULAR BRUSH BLOCK ASSEMBLY	1	
	1H1157	• SHIM, BRUSH BLOCK	2	
	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	2	Y
	B-6637-51	• SCREW, PAN HEAD, CRES	2	
	101964-262	• NUT, 6-32, HEX, STEEL	4	
	B-3837-N632	• WASHER	4	Y
	B-3871-S28	• SCREW, 6-32, 100° HEAD	4	
	104111	• BRACKET, MOUNTING, SYNCHROPHASER	2	
	<b>104128</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12AA</b>		
	3H2237	• BRACKET, MOUNTING, BRUSH BLOCK	1	
	3H2090-1	• MODULAR BRUSH BLOCK ASSEMBLY	1	
	1H1157	• SHIM, BRUSH BLOCK	2	
	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	2	Y
	B-6637-50	• SCREW, PAN HEAD, CRES	2	
	3H1872-2	• AMMETER, 14-18 AMPS	1	
	7931-91586-1	• MS91586-1 AMMETER SHUNT 30 AMPS	1	
	3H1964-3	• TIMER DE-ICE	1	
	7931-3E1964-3	• TIMER, DE-ICE, ALTERNATE FOR 3H1964-3	1	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit(s): 104009 and 104128**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**104009 and 104128**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

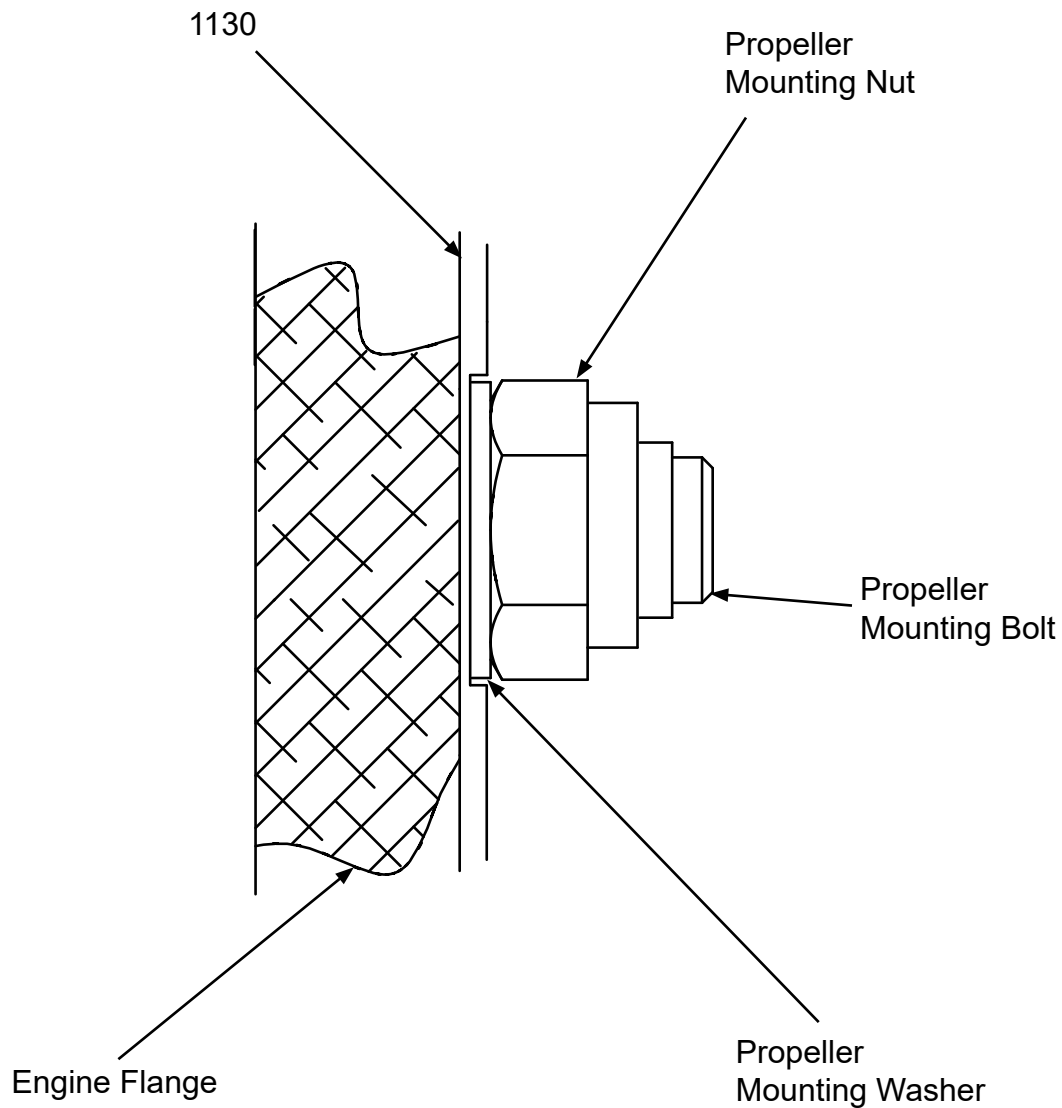
**104181**

**AB. Installation Instruction 12AB**

- (1) Using existing propeller mounting nuts and washers, attach the split mounting plate (1130) to the engine flange in accordance with Figure 12AB-1.
  - (a) The split between the split mounting plates (3065) must be aligned with the propeller dowel pins.
  - (b) Torque mounting nuts in accordance with the applicable Hartzell Propeller Owner's Manual 115N (61-00-15).
- (2) Using bolt (1350), washer (1200), belleville spring washer (1180), and nut (1190) attach the slip ring assembly (1140) to the split mounting plate (1130) in accordance with Figure 12AB-2.
  - (a) Align the slip ring assembly (1140) to the split mounting plates (1130) so the terminal studs are between blades.
  - (b) Torque the nuts (1350) 40 - 120 in-lbs. (4.5 - 14 N•m).
- (3) Perform the slip ring (1140) runout check in accordance with the instructions in the Check chapter of this manual.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**104181**

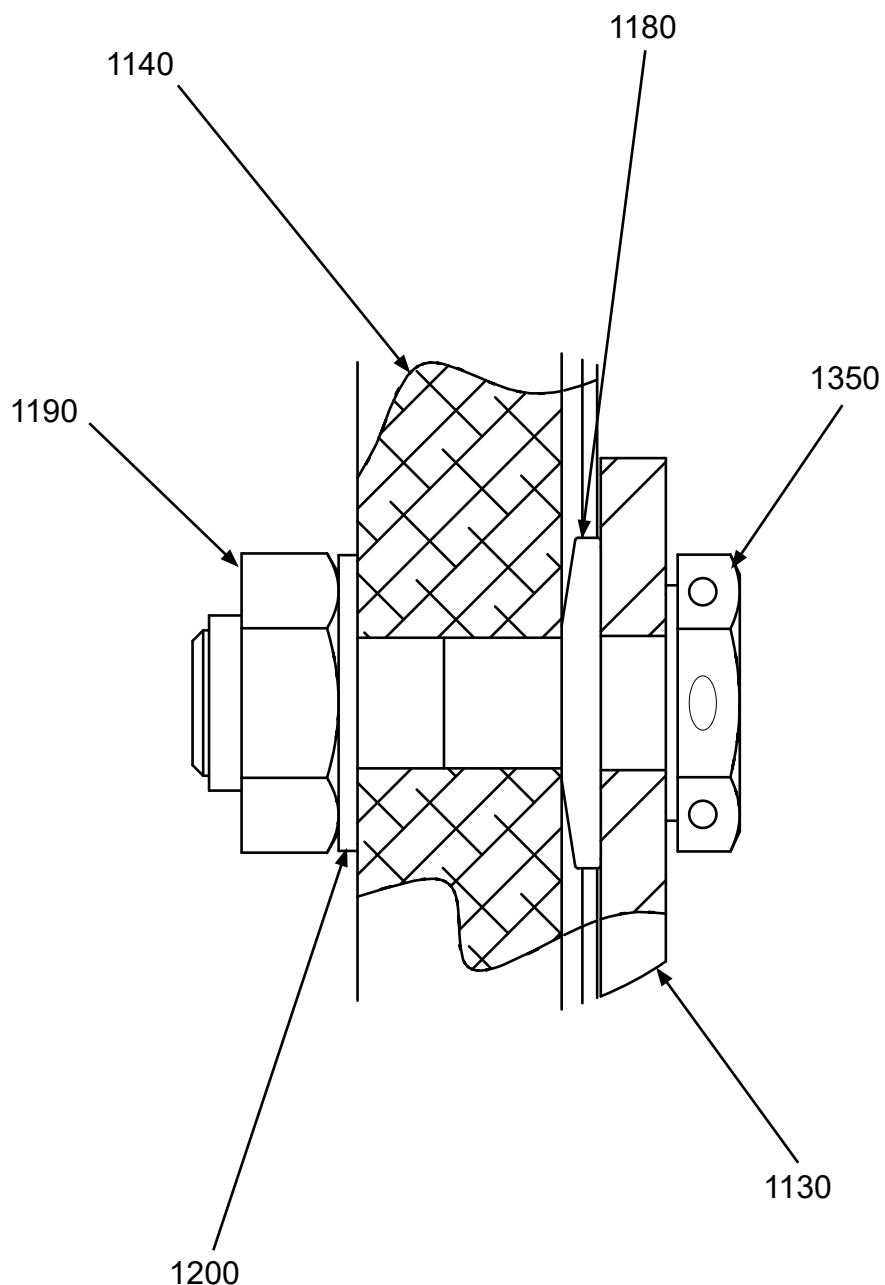


**Split Mounting Plate Attachment to Engine Flange  
Figure 12AB-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

**104181**



**Slip Ring Assembly Mounting  
Figure 12AB-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**104181**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>104181</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12AA FIGURES: 12AB-1 AND 12AB-2</b>		
1130	4H3174	• MOUNTING PLATE	2	
1140	4H2267-2	• SLIP RING ASSEMBLY	1	
1180	B-7076-42	• BELLEVILLE SPRING WASHER	6	Y
1190	B-3808-4	• NUT, HEX, SELF-LOCKING	6	Y
1200	B-3837-0432	• WASHER, CORROSION RESISTANT	6	Y
1350	B-3384-6H	• BOLT, 1/4-28, HEX HEAD	6	Y

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit(s): 104181**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

**104252, 104265, 104268, 104430, 104958, 105068, 105287, 105468, 105612, 105753**

AC. Installation Instruction 12AC

- (1) Install the airframe de-ice kit components in accordance with the applicable aircraft TC or STC holder's ICA.

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>104252</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12AC</b>		
	3H2044-1	• MODULAR BRUSH BLOCK ASSEMBLY	1	
	1H1157	• SHIM, BRUSH BLOCK ASS'Y	2	
	104250	• BRUSH BLOCK BRACKET	1	
	B-6655-08	• NUT, HEX, SELF-LOCKING	2	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
	B-6637-52	• SCREW, PAN HEAD, CRES	2	Y
	<b>104265</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12AC</b>		
	4H3153	• MOUNTING PLATE, SPLIT	2	
	4H2459-2	• SLIP RING ASSEMBLY	1	
	B-7077-52	• BELLEVILLE SPRING WASHER	6	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	6	Y
	3H2042-1	• MODULAR BRUSH BLOCK ASSEMBLY	1	
	1H1157	• SHIM, BRUSH BLOCK ASS'Y	2	
	B-3837-0432	• WASHER, CORROSION RESISTANT	6	Y
	B-3384-7H	• BOLT, 1/4-28, HEX HEAD	6	Y
	<b>104268</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12AC</b>		
	4H3153	• MOUNTING PLATE, SPLIT	2	
	4H2459-2	• SLIP RING ASSEMBLY	1	
	B-7077-52	• BELLEVILLE SPRING WASHER	6	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	6	Y
	3H2042-1	• MODULAR BRUSH BLOCK ASSEMBLY	1	
	1H1157	• SHIM, BRUSH BLOCK ASS'Y	2	
	B-6655-08	• NUT, HEX, SELF-LOCKING	2	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
	B-6637-52	• SCREW, PAN HEAD, CRES	2	Y
	B-3837-0432	• WASHER, CORROSION RESISTANT	6	Y
	B-3384-7H	• BOLT, 1/4-28, HEX HEAD	6	Y
	104277	• BRUSH BLOCK BRACKET	1	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit(s): 104252, 104265, and 104268**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

**104252, 104265, 104268, 104430, 104958, 105068, 105287, 105468, 105612, 105753**

AC. Installation Instruction 12AC

- (1) Install the airframe de-ice kit components in accordance with the applicable aircraft TC or STC holder's ICA.

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>104430</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12AC</b>		
	3H2237	• BRACKET, MOUNTING, BRUSH BLOCK	1	
	3H2090-1	• MODULAR BRUSH BLOCK ASSEMBLY	1	
	1H1157	• SHIM, BRUSH BLOCK ASS'Y	1	
	B-6655-08	• NUT, HEX, SELF-LOCKING	2	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
	B-6637-50	• SCREW, PAN HEAD, CRES	2	
	<b>104958</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12AC</b>		
	3H2044-3	• MODULAR BRUSH BLOCK ASSEMBLY	1	
	B-6637-52	• SCREW, PAN HEAD, CRESCENT	2	
	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
	B-6655-08	• NUT, SELF-LOCKING	2	
	<b>105068</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12AC</b>		
	105065	• BRACKET, MOUNTING, BRUSH BLOCK	1	
	105404	• MODULAR BRUSH BLOCK ASSEMBLY	1	
	105069	• MOV MODULE - ASSEMBLY	1	
	105070	• BRACKET, MOV	1	
	105398-53	• BOLT, 10-32, HEX HEAD	4	
	B-3837-0332	• WASHER, CORROSION RESISTANT	6	Y
	B-3855-32	• WASHER, LOCK, EXTERNAL TOOTH	2	Y
	B-3869-3	• NUT, HEX, SELF-LOCKING, CRES.	4	Y
	1H1157	• SHIM, BRUSH BLOCK	1	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit(s): 104430, 104958, and 105068**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

**104252, 104265, 104268, 104430, 104958, 105068, 105287, 105468, 105612, 105753**

AC. Installation Instruction 12AC

- (1) Install the airframe de-ice kit components in accordance with the applicable aircraft TC or STC holder's ICA.

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>105287</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12AC</b>		
	105228	• BRACKET, MOUNTING, BRUSH BLOCK	1	
	3H2044-3	• MODULAR BRUSH BLOCK ASSEMBLY	1	
	102395	• ELECTRICAL CONNECTOR	1	
	102337	• TIMER/MONITOR, DE-ICE	1	
	B-6637-52	• SCREW, PAN HEAD, CRES.	2	
	B-3837-N832	• WASHER, CRESCENT	4	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	2	Y
	1H1157	• SHIM, BRUSH BLOCK	1	
	<b>105468</b>	<b>AIRFRAME DE-ICE KIT (PER AIRCRAFT) INSTALLATION INSTRUCTION 12AC</b>		
	104250	• BRACKET, MOUNTING, BRUSH BLOCK	2	
	3H2044-1	• MODULAR BRUSH BLOCK ASSEMBLY	2	
	B-6637-52	• SCREW, PAN HEAD, CRES.	4	
	B-3837-N832	• WASHER, CRESCENT	8	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
	1H1157	• SHIM, BRUSH BLOCK	4	
	102395	• ELECTRICAL CONNECTOR	1	
	102337	• TIMER/MONITOR	1	
	<b>105612</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12AC</b>		
	103044	• BRACKET, MOUNTING, BRUSH BLOCK	2	
	3H2090-2	• MODULAR BRUSH BLOCK ASSEMBLY	2	
	B-6637-51	• SCREW, 8-32, PAN HEAD, CRES	4	
	B-3837-N832	• WASHER, CORROSION RESISTANT	8	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
	1H1157	• SHIM, BRUSH BLOCK	4	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit(s): 105287, 105468, and 105612**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

**104252, 104265, 104268, 104430, 104958, 105068, 105287, 105468, 105612, 105753**

AC. Installation Instruction 12AC

- (1) Install the airframe de-ice kit components in accordance with the applicable aircraft TC or STC holder's ICA.

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>105753</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12AC</b>		
	3H2090-1	• MODULAR BRUSH BLOCK ASSEMBLY	1	
	B-6637-51	• SCREW, PAN HEAD, CRES	2	
	B-3837-N832	• WASHER, CRESCENT	4	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	2	Y
	1H1157	• SHIM, BRUSH BLOCK	2	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit(s): 105753**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

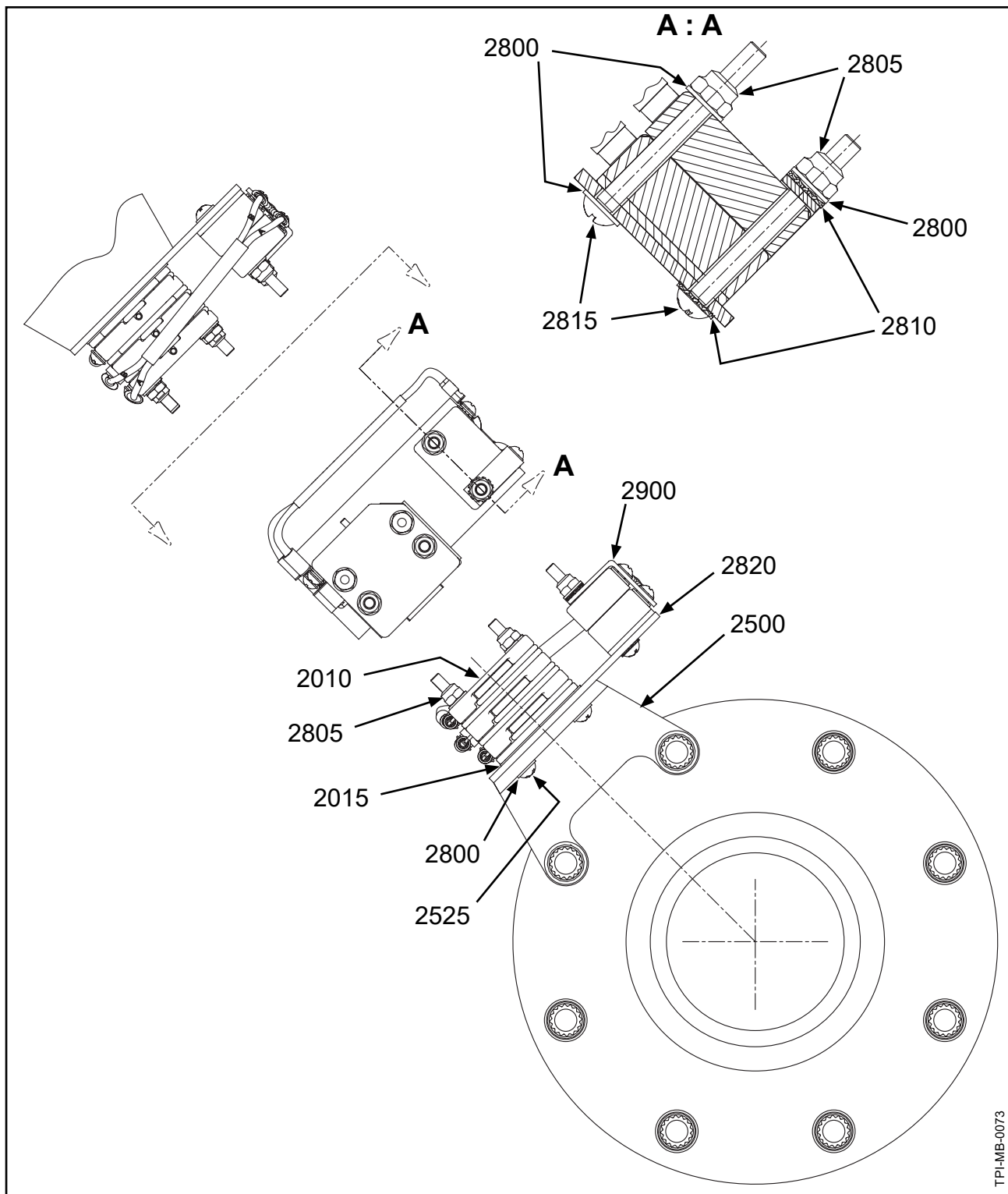
This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**105940**

AD. Installation Instruction 12AD

- (1) Install the airframe de-ice kit components in accordance with the applicable aircraft TC or STC holder's ICA or the instructions in this section.
- (2) Using two screws (2525), washers (2800), and nuts (2805), attach the mounting bracket (2820), brush block shim (2015), and the brush block assembly (2010) to the brush block bracket (2500) as shown in Figure 12AD-1.
  - (a) Torque each screw (2525) to 22-25 in-lbs. (2.5-2.8 N•m).
- (3) Using two screws (2815), lockwashers (2810), washers (2800), and nuts (2805), attach the MOV Module (2900) to the mounting bracket (2820) as shown in Figure 12AD-1.
  - (a) Torque each screw (2815) to 22-25 in-lbs. (2.5-2.8 N•m).
- (4) Attach MOV Module (2900) "A" wire to "A" brush block terminal (outboard).
- (5) Attach MOV Module (2900) "B" wire to "B" brush block terminal (inboard).
- (6) Refer to the airframe manufacturer's specification or applicable STC installation instructions for installation of the brush block bracket (2500) to the engine, and for the wiring of the brush block assembly (2010) and the MOV module (2900) to the aircraft.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**105940**



**Brush Block/MOV Installation  
Figure 12AD-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**105940**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>105940</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12AD FIGURE: 12AD-1</b>		
2010	3H2042-1	• MODULAR BRUSH BLOCK ASSEMBLY	1	
2015	1H1157	• SHIM, BRUSH BLOCK	2	
2500	105915	• BRACKET, MOUNTING, BRUSH BLOCK	1	
2525	B-6637-53	• SCREW, 8-32, PAN HEAD, CRES	2	
2800	B-3837-N832	• WASHER, CRES	7	Y
2805	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
2810	B-3855-31	• WASHER, LOCK, EXTERNAL TOOTH	2	Y
2815	B-6637-52	• SCREW, 8-32, PAN HEAD, CRES	2	
2820	105070	• BRACKET, MOUNTING	1	
2900	4H3076-3	• MOV MODULE - ASSEMBLY	1	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit(s): 105940**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**105940**

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# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

**106095 and 108053**

**AE. Installation Instruction 12AE**

- (1) Install the airframe de-ice kit components in accordance with the applicable aircraft TC or STC holder's ICA.

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>106095</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12AE</b>		
	105070	• BRACKET, MOUNTING	2	
	1H1157	• SHIM, BRUSH BLOCK	2	
	3H2090-1	• MODULAR BRUSH BLOCK ASSEMBLY	2	
	106343	• MOV MODULE - ASSEMBLY	2	
	B-3837-N832	• WASHER, CORROSION RESISTANT	12	Y
	B-3855-31	• WASHER, LOCK, EXTERNAL TOOTH	4	Y
	B-6637-51	• SCREW, 8-32, PAN HEAD, CRES	4	
	B-6637-52	• SCREW, 8-32, PAN HEAD, CRES	4	
	B-6655-08	• NUT, HEX, SELF-LOCKING	8	Y
	<b>108053</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12AE</b>		
	108054	• BRACKET, MOUNTING, BRUSH BLOCK	1	
	1H1157	• SHIM, BRUSH BLOCK	1	
	3H2090-1	• MODULAR BRUSH BLOCK ASSEMBLY	1	
	105273	• MOV MODULE - ASSEMBLY	1	
	B-3837-N832	• WASHER, CORROSION RESISTANT	6	Y
	B-3855-31	• WASHER, LOCK, EXTERNAL TOOTH	2	Y
	B-6637-51	• SCREW, 8-32, PAN HEAD, CRES	2	
	B-6637-52	• SCREW, 8-32, PAN HEAD, CRES	2	
	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit(s): 106095**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**106095 and 108053**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

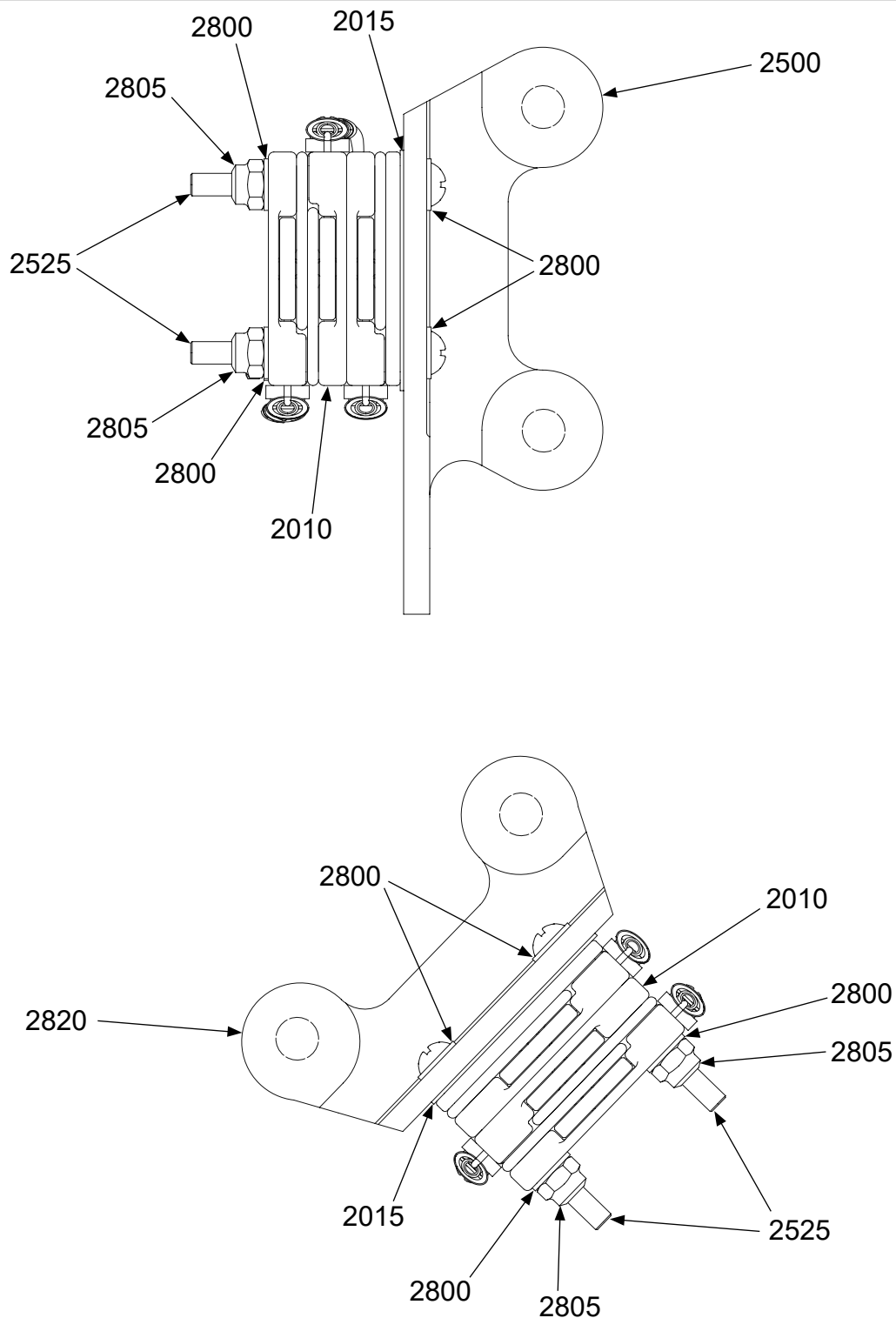
**106337**

AF. Installation Instruction 12AF

- (1) Using two screws (2525), four washers (2800), and two nuts (2805), attach the brush block shim (2015), and the brush block assembly (2010) to the brush block mounting bracket (2500) as shown in Figure 12AF-1.
  - (a) Torque each screw (2525) to 22-25 In-Lbs (2.5-2.8 N•m).
- (2) Using two screws (2525), four washers (2800), and two nuts (2805), attach the brush block shim (2015) and the brush block assembly (2010) to the brush block mounting bracket (2820) as shown in Figure 12AF-1.
  - (a) Torque each screw (2525) to 22-25 In-Lbs (2.5-2.8 N•m).
- (3) Using two screws (2525), two lockwashers (2810), two washers (2800), and two nuts (2805), attach the MOV Module (2900) to the brush block mounting bracket (2500) as shown in Figure 12AF-2.
- (4) Attach MOV Module (2900) "A" wire to "A" brush block terminal (outboard).
- (5) Attach MOV Module (2900) "B" wire to "B" brush block terminal (inboard).
- (6) Refer to the airframe manufacturer's specification or applicable STC installation instructions for installation of the brush block mounting brackets (2500 and 2820) to the engine, and for the wiring of the brush block assemblies (2010) and the MOV module (2900) to the aircraft.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**106337**

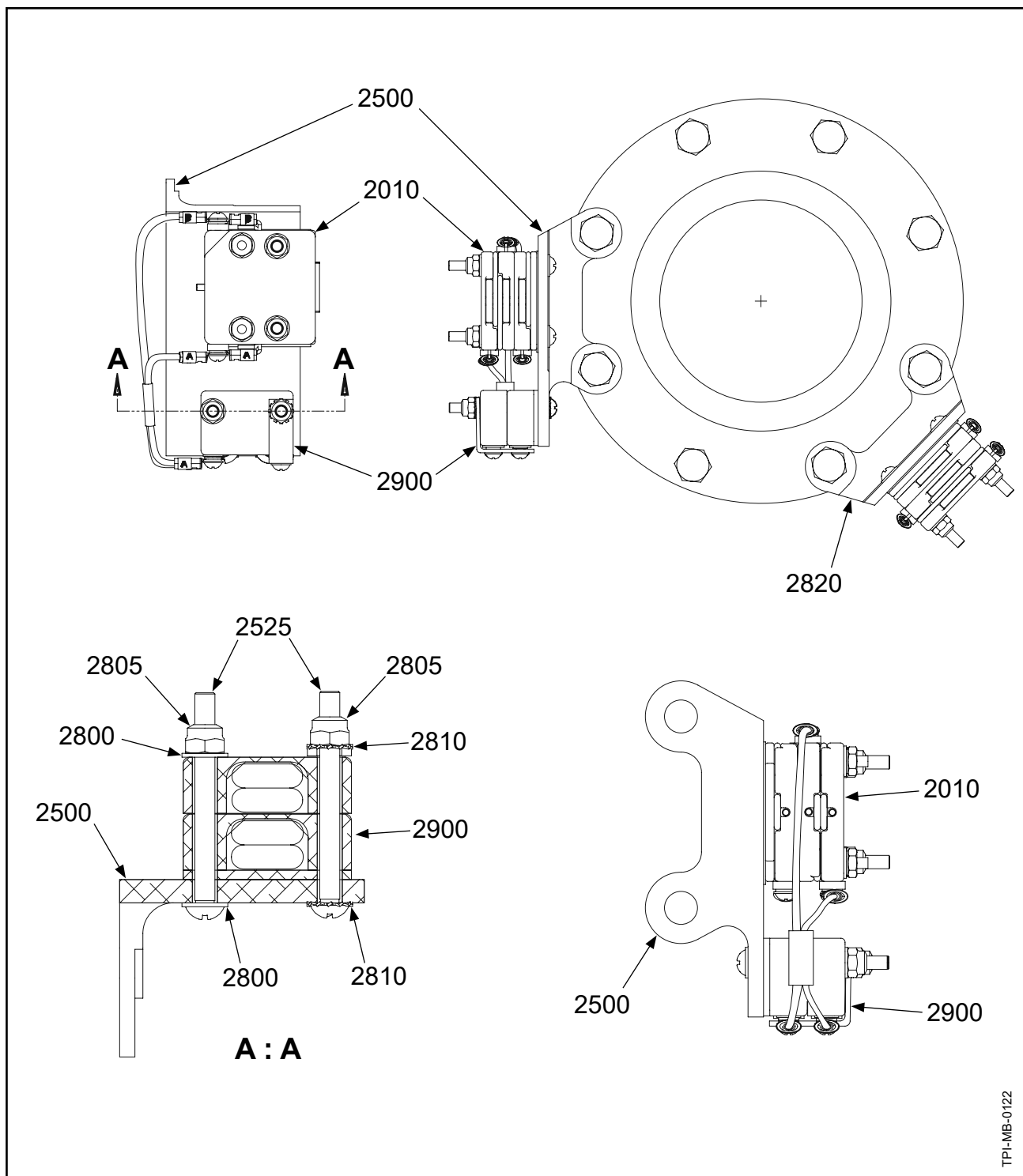


**Brush Block Installation  
Figure 12AF-1**

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

**106337**



**MOV Installation  
Figure 12AF-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**106337**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>106337</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12AF FIGURES: 12AF-1 AND 12AF-2</b>		
2010	105404	• MODULAR BRUSH BLOCK ASSEMBLY	2	
2015	1H1157	• SHIM, BRUSH BLOCK	4	
2500	106335	• BRACKET, MOUNTING, BRUSH BLOCK	1	
2525	B-6637-52	• SCREW, 8-32, PAN HEAD, CRES	6	
2800	B-3837-N832	• WASHER, CORROSION RESISTANT	10	Y
2805	B-6655-08	• NUT, HEX, SELF-LOCKING	6	Y
2810	B-3855-31	• WASHER, LOCK, EXTERNAL TOOTH	2	Y
2820	103044	• BRACKET, MOUNTING, BRUSH BLOCK	1	
2900	106340	• MOV MODULE - ASSEMBLY	1	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit(s): 106337**

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

**106530, 106558, 106592, 106612**

**AG. Installation Instruction 12AG**

- (1) Install the airframe de-ice kit components in accordance with the applicable aircraft TC or STC holder's ICA.

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>106530</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12AG</b>		
	103044	• BRACKET, MOUNTING, BRUSH BLOCK	2	
	105404	• MODULAR BRUSH BLOCK ASSEMBLY	2	
	1H1157	• SHIM, BRUSH BLOCK	4	
	B-6637-52	• SCREW, 8-32, PAN HEAD, CRES	4	
	B-3837-N832	• WASHER, CORROSION RESISTANT	8	
	B-6655-08	• NUT, HEX, SELF-LOCKING	4	
	<b>106558</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12AG</b>		
	102337	• TIMER/MONITOR	1	
	3H2042-1	• MODULAR BRUSH BLOCK ASSEMBLY	1	
	B-6637-53	• SCREW, 8-32, PAN HEAD, CRES.	2	
	B-3837-N832	• WASHER, CORROSION RESISTANT	7	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
	4H3076-3	• MOV MODULE - ASSEMBLY	1	
	105070	• BRACKET, MOUNTING	1	
	B-3855-31	• WASHER, LOCK, EXTERNAL TOOTH	2	Y
	1H1157	• SHIM, BRUSH BLOCK	2	
	B-6637-52	• SCREW, 8-32, PAN HEAD, CRES.	2	
	<b>106592</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12AG</b>		
	105404	• MODULAR BRUSH BLOCK ASSEMBLY	1	
	1H1157	• SHIM, BRUSH BLOCK	2	
	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
	B-3837-N832	• WASHER, CRES	6	Y
	B-6637-52	• SCREW, PAN HEAD, CRES	4	
	B-3855-31	• WASHER, LOCK, EXTERNAL TOOTH	2	Y
	106340	• MOV MODULE - ASSEMBLY	1	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit(s): 106530, 106558, and 106592**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**106530, 106558, 106592, 106612**

AG. Installation Instruction 12AG

- (1) Install the airframe de-ice kit components in accordance with the applicable aircraft TC or STC holder's ICA.

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>106612</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12AG</b>		
	105404	• MODULAR BRUSH BLOCK ASSEMBLY	1	
	1H1157	• SHIM, BRUSH BLOCK	1	
	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
	B-3837-N832	• WASHER, CORROSION RESISTANT	6	Y
	B-6637-52	• SCREW, 8-32, PAN HEAD, CRES.	4	
	B-3855-31	• WASHER, LOCK, EXTERNAL TOOTH	2	Y
	105069	• MOV MODULE - ASSEMBLY	1	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit(s): 106612**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

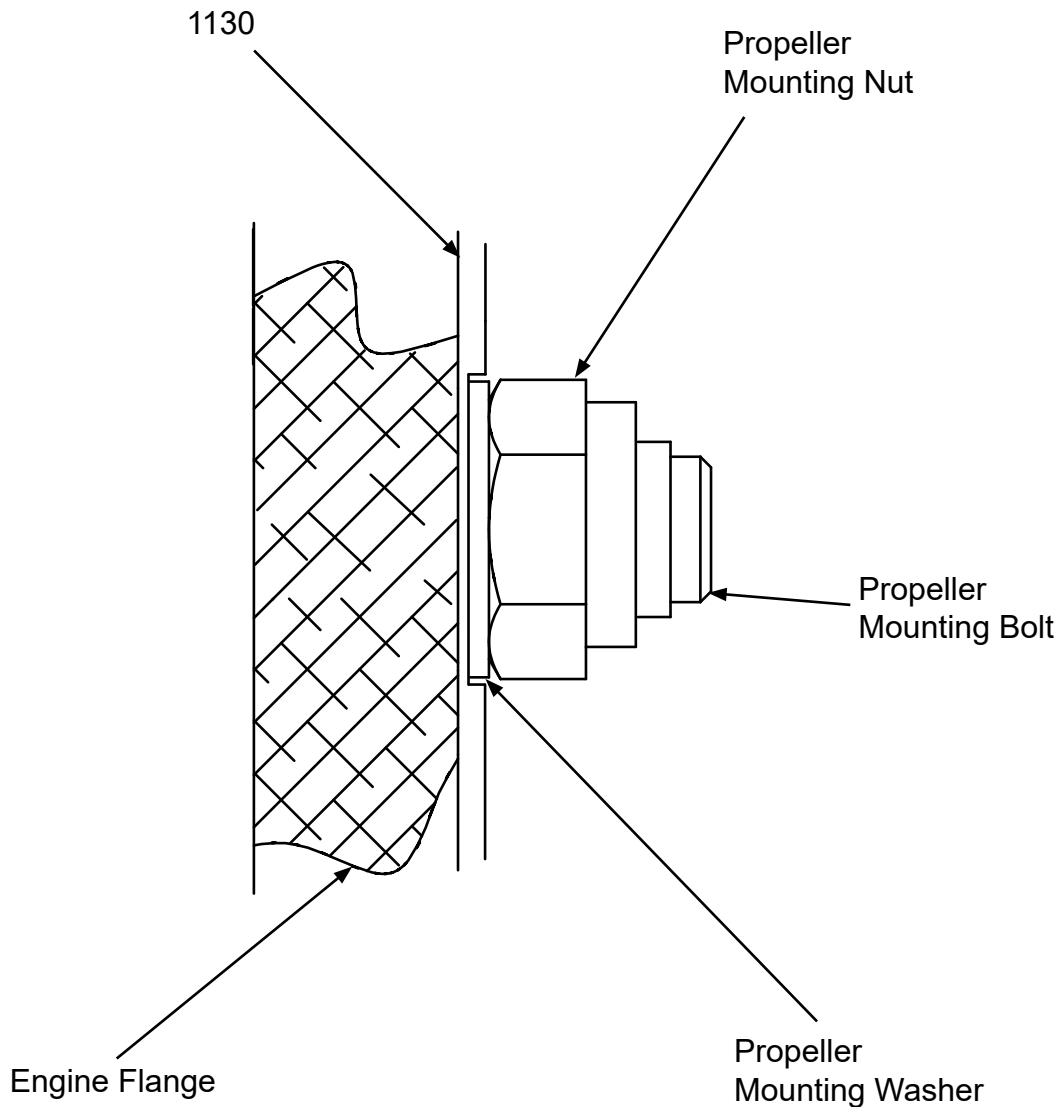
This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**106832 and 108347**

**AH.    Installation Instruction 12AH**

- (1) Using existing propeller mounting nuts and washers, attach the split mounting plate (1130) to the engine flange in accordance with Figure 12AH-1.
  - (a) Torque the propeller mounting nuts in accordance with the Hartzell Propeller Owner's Manual 115N (61-00-15).
- (2) Using bolt (1350), washer (1200), belleville spring washer (1180), and nut (1190), attach the slip ring assembly (1140) to the split mounting plate (1130) in accordance with Figure 12AH-2.
  - (a) Align the slip ring assembly (1140) to the split mounting plate (1130) so the terminal studs are between the blades.
  - (b) Torque the bolts (1350) 40-120 In-Lbs (4.6-13.5 N•m).
- (3) Do a slip ring (1140) runout check in accordance with the instructions in the Check chapter of this manual.
- (4) Using two screws (2525), four washers (2520), and two nuts (2515), attach the brush block shim (2015), and the brush block assembly (2010) to the brush block mounting bracket (2500) in accordance with Figure 12AH-3.
  - (a) Torque each screw (2525) to 22-25 In-Lbs (2.5-2.8 N•m).
- (5) Using two screws (2815), lockwasher (2810), and washer (2800), attach the MOV Module (2900) to the brush block mounting bracket (2500) in accordance with Figure 12AH-4.
  - (a) Torque each screw (2815) to 22-25 In-Lbs (2.5-2.8 N•m).
- (6) Attach MOV Module (2900) "B" wire to "B" brush block terminal (outboard).
- (7) Attach MOV Module (2900) "C" wire to "C" brush block terminal (inboard).
- (8) Using bolt (2610), washers (3066), spacers (3065), existing washers, and existing nut in accordance with Figure 12AH-3, attach the brush block mounting bracket (2500) to the engine.
  - (a) Use the existing washers and washers (3066) to get the correct grip length of bolt (2610).
  - (b) Torque the bolts (2610) in accordance with the applicable aircraft maintenance manual.
- (9) Align brush block assembly (2010) to the slip ring assembly in accordance with the instructions in the Assembly chapter of this manual.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

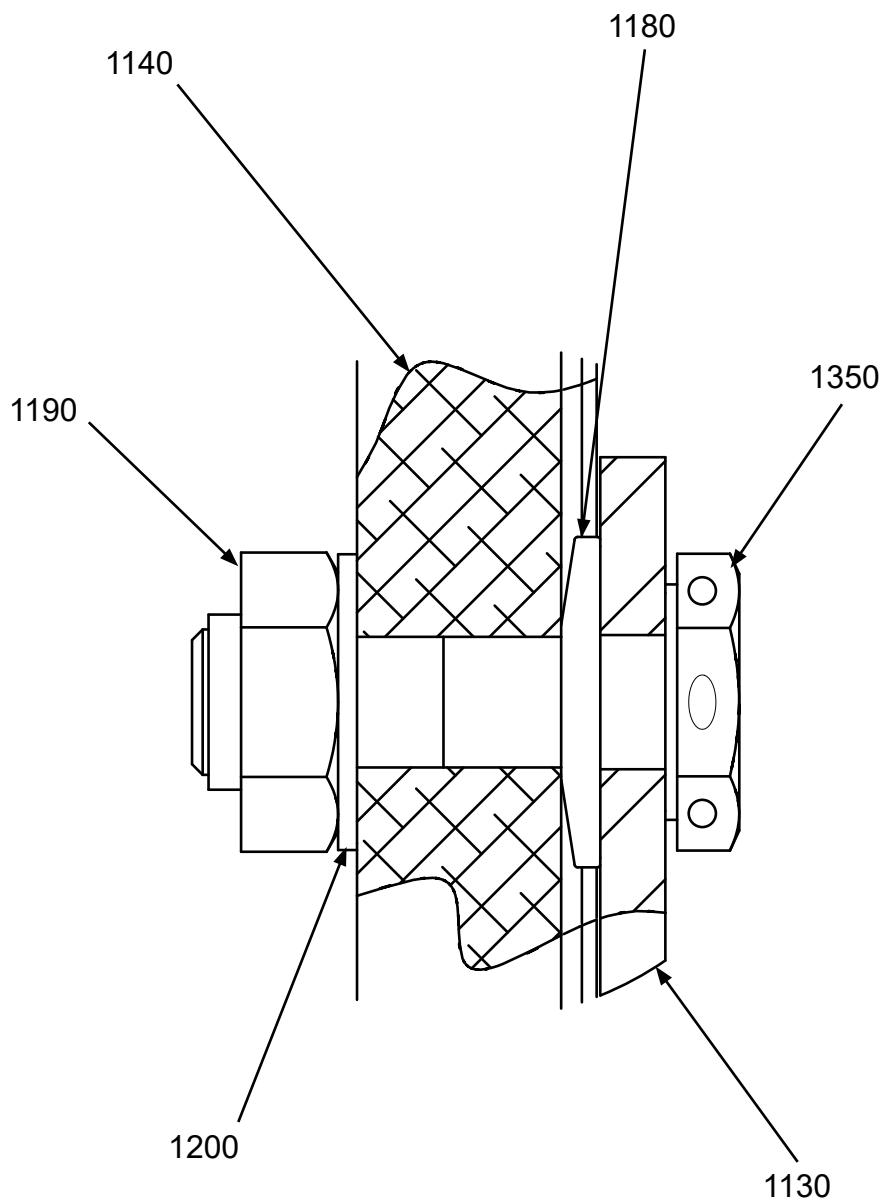
This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**106832 and 108347**



**Split Mounting Plate Attachment to Engine Flange  
Figure 12AH-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

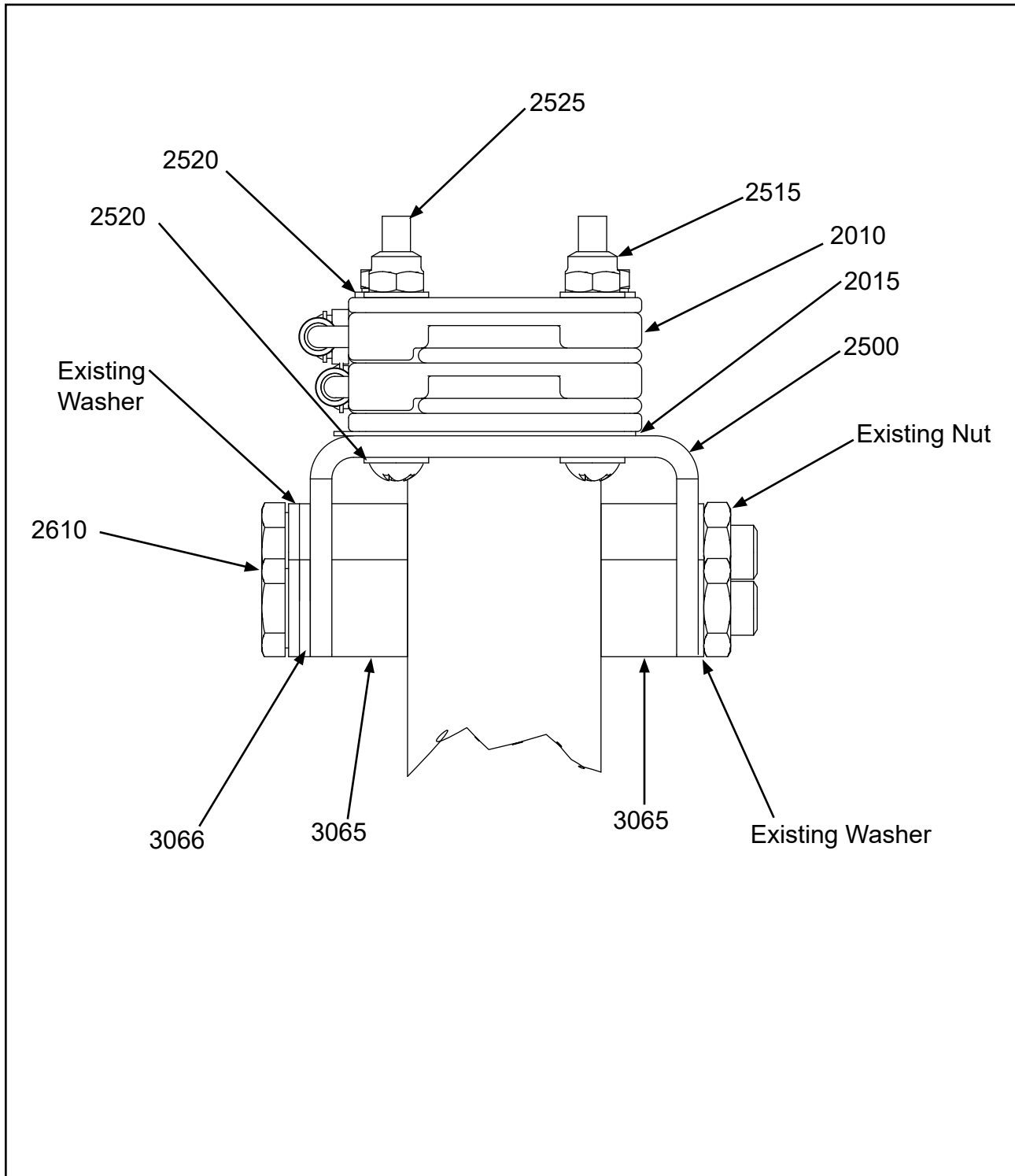
This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**106832 and 108347**



**Slip Ring Assembly Mounting  
Figure 12AH-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

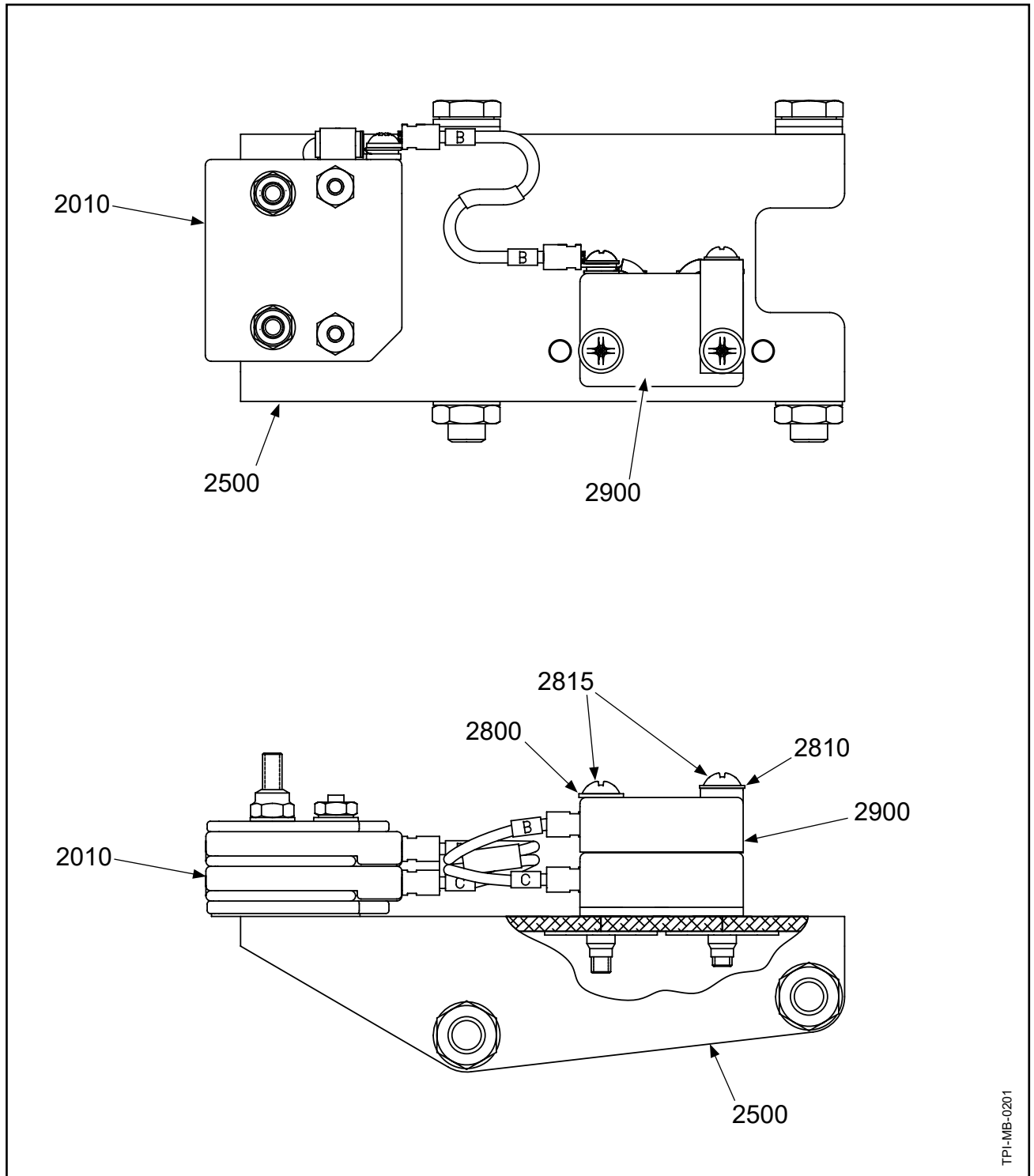
This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**106832 and 108347**



**Brush Block Installation  
Figure 12AH-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**106832 and 108347**



**MOV Installation  
Figure 12AH-4**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**106832 and 108347**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>106832</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12AH FIGURES: 12AH-1 thru 12AH-4</b>		
1130	4H3174	• PLATE, MOUNTING, SPLIT	2	
1140	106613	• SLIP RING ASSEMBLY	1	
1180	B-7076-42	• BELLEVILLE SPRING WASHER	6	Y
1190	B-3808-4	• NUT, HEX, SELF-LOCKING	6	Y
1200	B-3837-0432	• WASHER, CORROSION RESISTANT	6	Y
1350	B-3384-6H	• BOLT, 1/4-28, HEX HEAD	6	Y
2010	3H2062-2	• MODULAR BRUSH BLOCK ASSEMBLY	1	
2015	1H1157	• SHIM, BRUSH BLOCK	1	
2500	106803	• BRACKET, MOUNTING, BRUSH BLOCK	1	
2515	B-6655-08	• NUT, HEX, SELF-LOCKING	2	Y
2520	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
2525	B-6637-51	• SCREW, 8-32, PAN HEAD, CRES.	2	
2610	B-3875-25A	• BOLT, 5/16-24, HEX HEAD	2	
3065	1H1211	• SPACER	4	
3066	B-3837-0563	• WASHER, CORROSION RESISTANT	4	Y
2800	B-3837-N832	• WASHER, CORROSION RESISTANT	1	Y
2810	B-3855-31	• WASHER, LOCK, EXTERNAL TOOTH	1	Y
2815	B-6637-51	• SCREW, 8-32, PAN HEAD, CRES.	2	
2900	106802	• MOV MODULE - ASSEMBLY	1	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit(s): 106932**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**106832 and 108347**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>108347</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12AH FIGURES: 12AH-1 thru 12AH-4</b>		
1130	4H3153	• PLATE, MOUNTING, SPLIT	2	
1140	106613	• SLIP RING ASSEMBLY	1	
1180	B-7076-42	• BELLEVILLE SPRING WASHER	6	Y
1190	B-3808-4	• NUT, HEX, SELF-LOCKING	6	Y
1200	B-3837-0432	• WASHER, CORROSION RESISTANT	6	Y
1350	B-3384-6H	• BOLT, 1/4-28, HEX HEAD	6	Y
2010	3H2062-2	• MODULAR BRUSH BLOCK ASSEMBLY	1	
2015	1H1157	• SHIM, BRUSH BLOCK	1	
2500	106803	• BRACKET, MOUNTING, BRUSH BLOCK	1	
2515	B-6655-08	• NUT, HEX, SELF-LOCKING	2	Y
2520	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
2525	B-6637-51	• SCREW, 8-32, PAN HEAD, CRES.	2	
2610	B-3875-25A	• BOLT, 5/16-24, HEX HEAD	2	
3065	1H1211	• SPACER	4	
3066	B-3837-0563	• WASHER, CORROSION RESISTANT	4	Y
2800	B-3837-N832	• WASHER, CORROSION RESISTANT	1	Y
2810	B-3855-31	• WASHER, LOCK, EXTERNAL TOOTH	1	Y
2815	B-6637-51	• SCREW, 8-32, PAN HEAD, CRES.	2	
2900	106802	• MOV MODULE - ASSEMBLY	1	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit(s): 108347**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**106832 and 108347**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

**106855, 106856, and 107002**

**Al. Installation Instruction 12AI**

- (1) Install the airframe de-ice kit components in accordance with the applicable aircraft TC or STC holder's ICA.

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>106855</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12AI</b>		
	3H2044-3	• MODULAR BRUSH BLOCK ASSEMBLY	1	
	3H2223	• BRACKET, MOUNTING, BRUSH BLOCK	1	
	1H1157	• SHIM, BRUSH BLOCK	2	
	B-6637-52	• SCREW, 8-32, PAN HEAD, CRES.	2	
	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	2	Y
	102337	• TIMER/MONITOR	1	
	102395	• ELECTRICAL CONNECTOR	1	
	106852	• AMMETER, 8-12 AMPS	1	
	7931-91586-2	• MS91586-2 AMMETER SHUNT 50 AMP	1	
	<b>106856</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12AI</b>		
	102337	• TIMER/MONITOR	1	
	3H2044-3	• MODULAR BRUSH BLOCK ASSEMBLY	1	
	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	2	Y
	106859	• BRACKET, MOUNTING, BRUSH BLOCK	1	
	1H1157	• SHIM, BRUSH BLOCK	2	
	B-6637-52	• SCREW, 8-32, PAN HEAD, CRES.	2	
	102395	• ELECTRICAL CONNECTOR	1	
	106852	• AMMETER, 8-12 AMPS	1	
	7931-91586-2	• MS91586-2 AMMETER SHUNT 50 AMP	1	
	<b>107002</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12AI</b>		
	3H2090-1	• MODULAR BRUSH BLOCK ASSEMBLY	1	
	106335	• BRACKET, MOUNTING, BRUSH BLOCK	1	
	1H1157	• SHIM, BRUSH BLOCK	1	
	B-6637-52	• SCREW, 8-32, PAN HEAD, CRES.	2	
	B-3837-N832	• WASHER, CORROSION RESISTANT	6	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
	B-6637-51	• SCREW, 8-32, PAN HEAD, CRES	2	
	105273	• MOV MODULE - ASSEMBLY	1	
	B-3855-31	• WASHER, LOCK, EXTERNAL TOOTH	2	Y

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit(s): 106855, 106856, and 107002**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**106855, 106856, and 107002**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

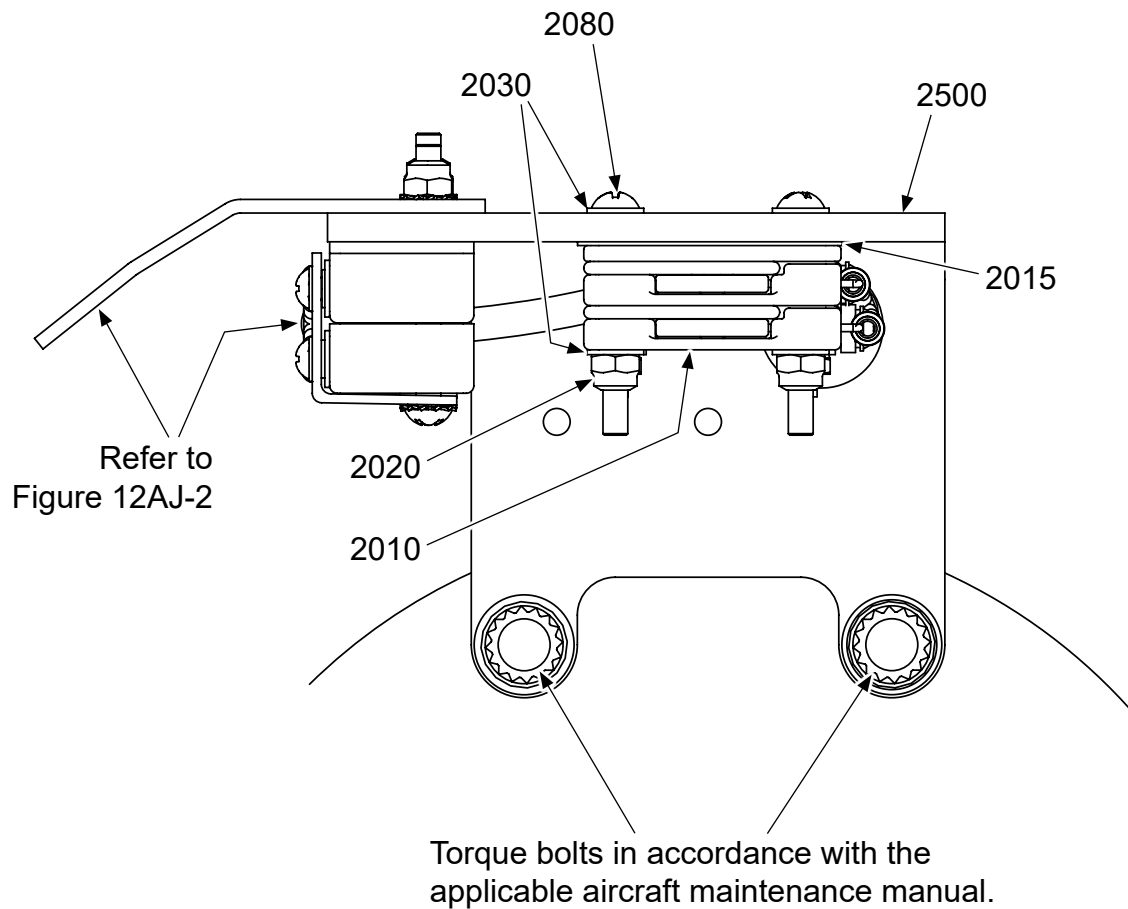
This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**106819 and 107266**

**AJ.    Installation Instruction 12AJ**

- (1) Using two screws (2080), four washers (2030), and two nuts (2020), attach the brush block shim (2015), and the brush block assembly (2010) to the brush block mounting bracket (2500) as shown in Figure 12AJ-1.
- (2) Using two screws (2040), two lockwashers (2050), two washers (2030), and two nuts (2020), attach the MOV Module (2900) and the synchrophaser mounting bracket (2070) to the brush block mounting bracket (2500) as shown in Figure 12AJ-2.
  - (a) Torque each screw (2040) to 22-25 In-Lbs (2.5-2.8 N•m).
- (3) Attach MOV Module (2900) "B" wire to the "B" terminal of brush block (2010) (outboard).
- (4) Attach MOV Module (2900) "C" wire to the "C" terminal of brush block (2010) (inboard).
- (5) Refer to the aircraft manufacturer's specification or applicable STC installation instructions for installation of the brush block mounting brackets (2500) to the engine, and for the wiring of the brush block assemblies (2010) to the aircraft.
- (6) Align brush block assembly (2010) to the slip ring assembly in accordance with the instructions in the Assembly chapter of this manual.
  - (a) Torque each screw (2080) to 22-25 In-Lbs (2.5-2.8 N•m).
- (7) Using bolts (2150), washers (2110 and 2140), nuts (2100 and 2130), install the sync target mounting bracket (2160) to the spinner bulkhead and the threaded magnetic target (1150) to the sync target mounting bracket (2160) in accordance with Figure 12AJ-3 and the aircraft manufacturer's specification or applicable STC installation instructions.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**106819 and 107266**

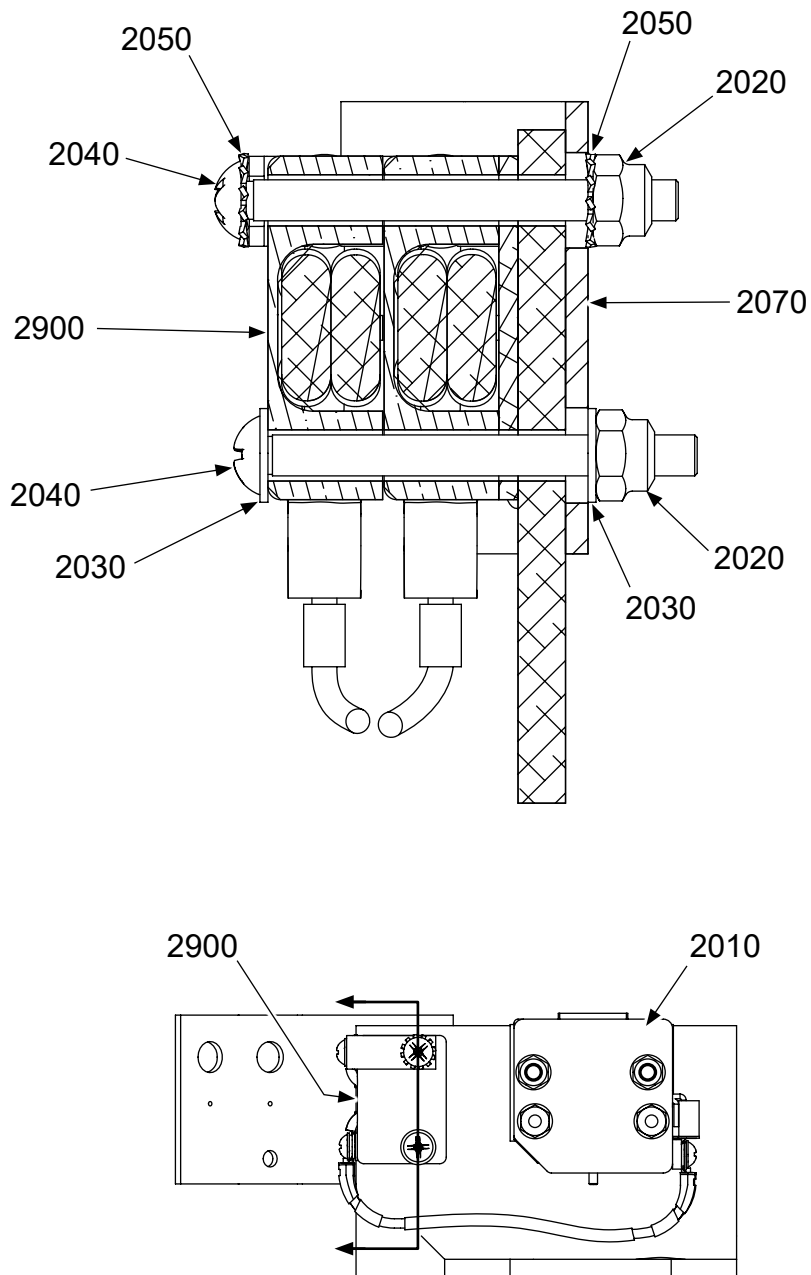


TP-1-MB-0303

**Brush Block Installation  
Figure 12AJ-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**106819 and 107266**

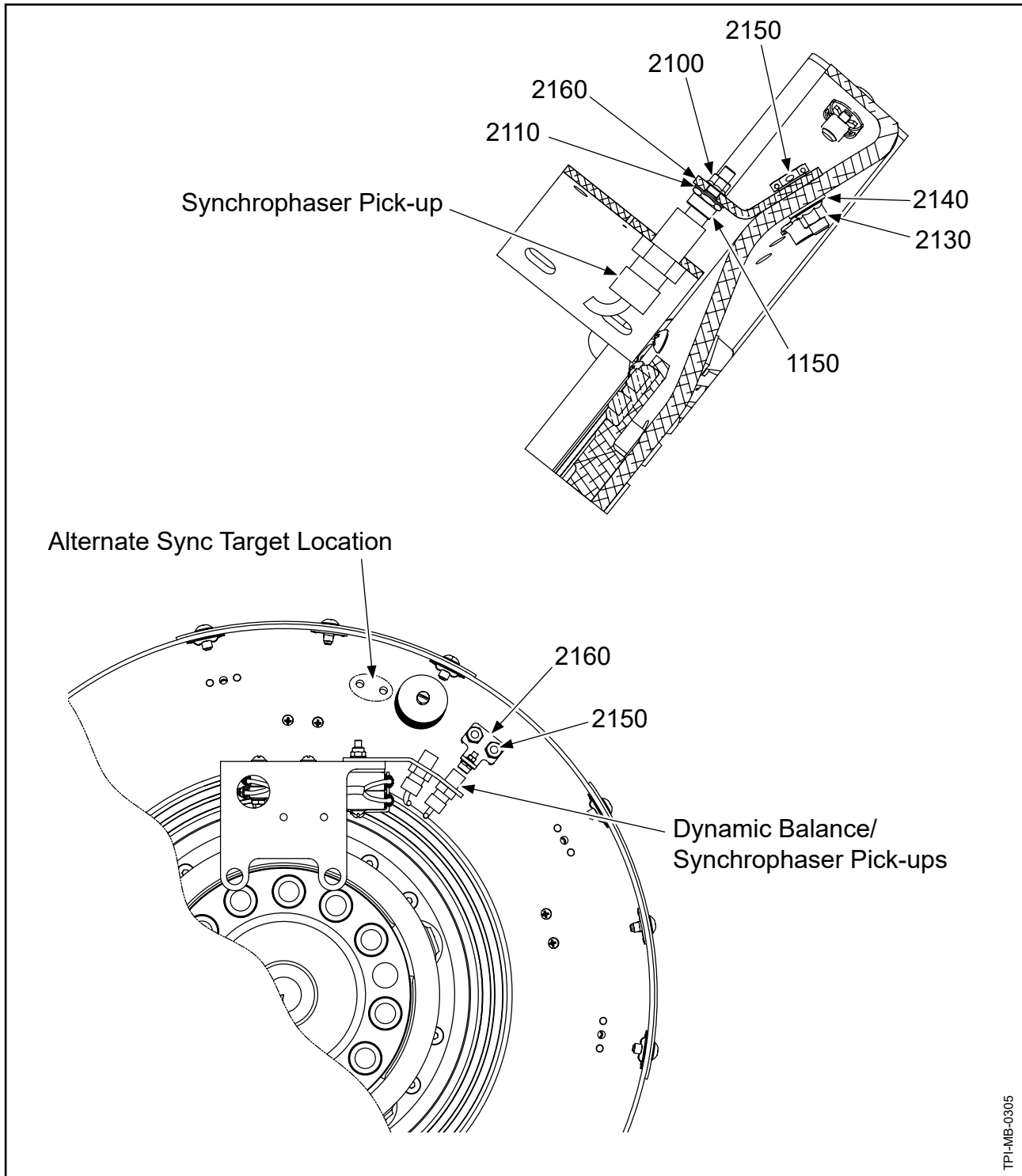


TP1MB-0304

**MOV Installation  
Figure 12AJ-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**106819 and 107266**



**Synchrophaser Installation  
Figure 12AJ-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

**106819 and 107266**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>106819</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12AJ FIGURES: 12AJ-1 thru 12AJ-3</b>		
1150	B-6371	• TARGET, MAGNETIC, THREADED	2	
2010	3H2090-2	• MODULAR BRUSH BLOCK ASSEMBLY	2	
2015	1H1157	• SHIM, BRUSH BLOCK	2	
2020	B-6655-08	• NUT, HEX, SELF-LOCKING	8	Y
2030	B-3837-N832	• WASHER, CORROSION RESISTANT	12	Y
2040	B-6637-52	• SCREW, 8-32, PAN HEAD, CRES.	4	
2050	B-3855-31	• WASHER, LOCK, EXTERNAL TOOTH	4	Y
2070	106997	• BRACKET, MOUNTING, SYNCHROPHASER	2	
2080	B-6637-51	• SCREW, PAN HEAD, CORROSION RESISTANT	4	
2100	B-3869-06	• NUT, SELF-LOCKING, CRES	2	Y
2110	B-3837-N616	• WASHER, CORROSION RESISTANT	2	Y
2130	B-3869-3	• NUT, SELF-LOCKING, CRES	4	
2140	B-3851-0332	• WASHER	4	Y
2150	B-3383-4H	• BOLT, 10-32, HEX HEAD	4	Y
2160	106989	• BRACKET, MOUNTING - SYNCH TARGET	2	
2500	106936	• BRACKET, MOUNTING, BRUSH BLOCK	2	
2900	106821	• MOV MODULE - ASSEMBLY	2	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit(s): 106819**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**106819 and 107266**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>107266</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12AJ FIGURES: 12AJ-1 thru 12AJ-3</b>		
1150	B-6371	• TARGET, MAGNETIC, THREADED	2	
2010	3H2090-2	• MODULAR BRUSH BLOCK ASSEMBLY	2	
2015	1H1157	• SHIM, BRUSH BLOCK	2	
2020	B-6655-08	• NUT, HEX, SELF-LOCKING	8	Y
2030	B-3837-N832	• WASHER, CORROSION RESISTANT	12	Y
2040	B-6637-52	• SCREW, 8-32, PAN HEAD, CRES.	4	
2050	B-3855-31	• WASHER, LOCK, EXTERNAL TOOTH	4	Y
2070	106997	• BRACKET, MOUNTING, SYNCHROPHASER	2	
2080	B-6637-51	• SCREW, PAN HEAD, CORROSION RESISTANT	4	
2100	B-3869-06	• NUT, SELF-LOCKING, CRES	2	Y
2110	B-3837-N616	• WASHER, CORROSION RESISTANT	2	Y
2130	B-3869-3	• NUT, SELF-LOCKING, CRES	4	
2140	B-3851-0332	• WASHER	4	Y
2150	B-3383-4H	• BOLT, 10-32, HEX HEAD	4	Y
2160	106989	• BRACKET, MOUNTING - SYNCH TARGET	2	
2500	106936-1	• BRACKET, MOUNTING, BRUSH BLOCK	2	
2900	106821	• MOV MODULE - ASSEMBLY	2	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit(s): 107266**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

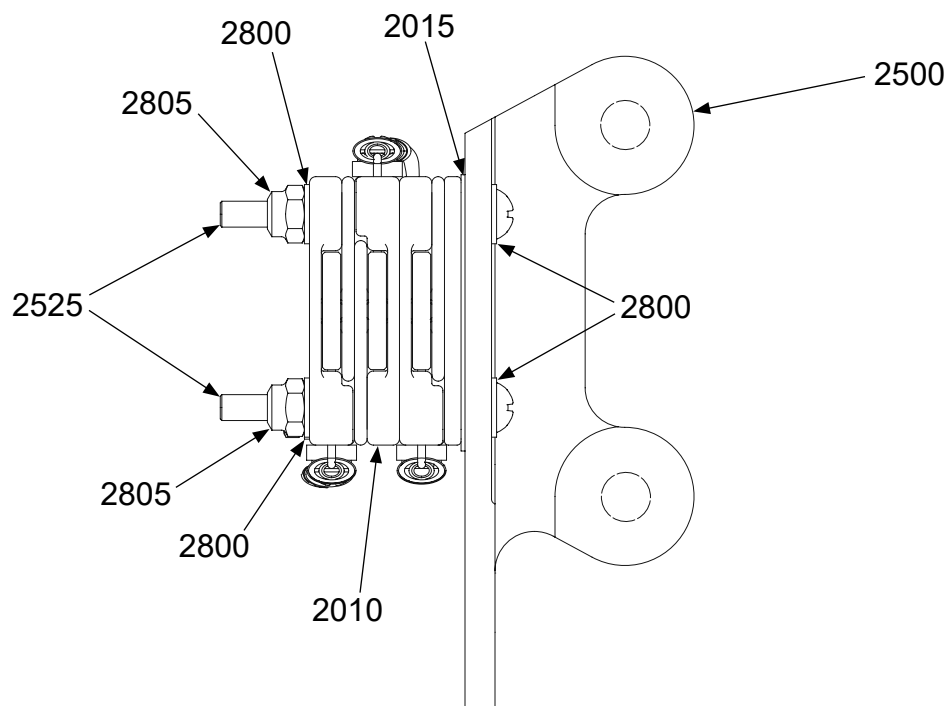
**107595 and 107718**

AK. Installation Instruction 12AK

- (1) Using two screws (2525), four washers (2800), and two nuts (2805), attach the brush block shim (2015), and the brush block assembly (2010) to the brush block mounting bracket (2500) as shown in Figure 12AK-1.
  - (a) Torque each screw (2525) to 22-25 In-Lbs (2.5-2.8 N•m).
- (2) Using two screws (2525), two lockwashers (2810), two washers (2800), and two nuts (2805), attach the MOV Module (2900) to the brush block mounting bracket (2500) as shown in Figure 12AK-2.
- (3) Attach MOV Module (2900) "A" wire to "A" brush block terminal (outboard).
- (4) Attach MOV Module (2900) "B" wire to "B" brush block terminal (inboard).
- (5) Refer to the airframe manufacturer's specification or applicable STC installation instructions for installation of the brush block mounting bracket (2500) to the engine, and for the wiring of the brush block assembly (2010) and the MOV module (2900) to the aircraft.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**107595 and 107718**

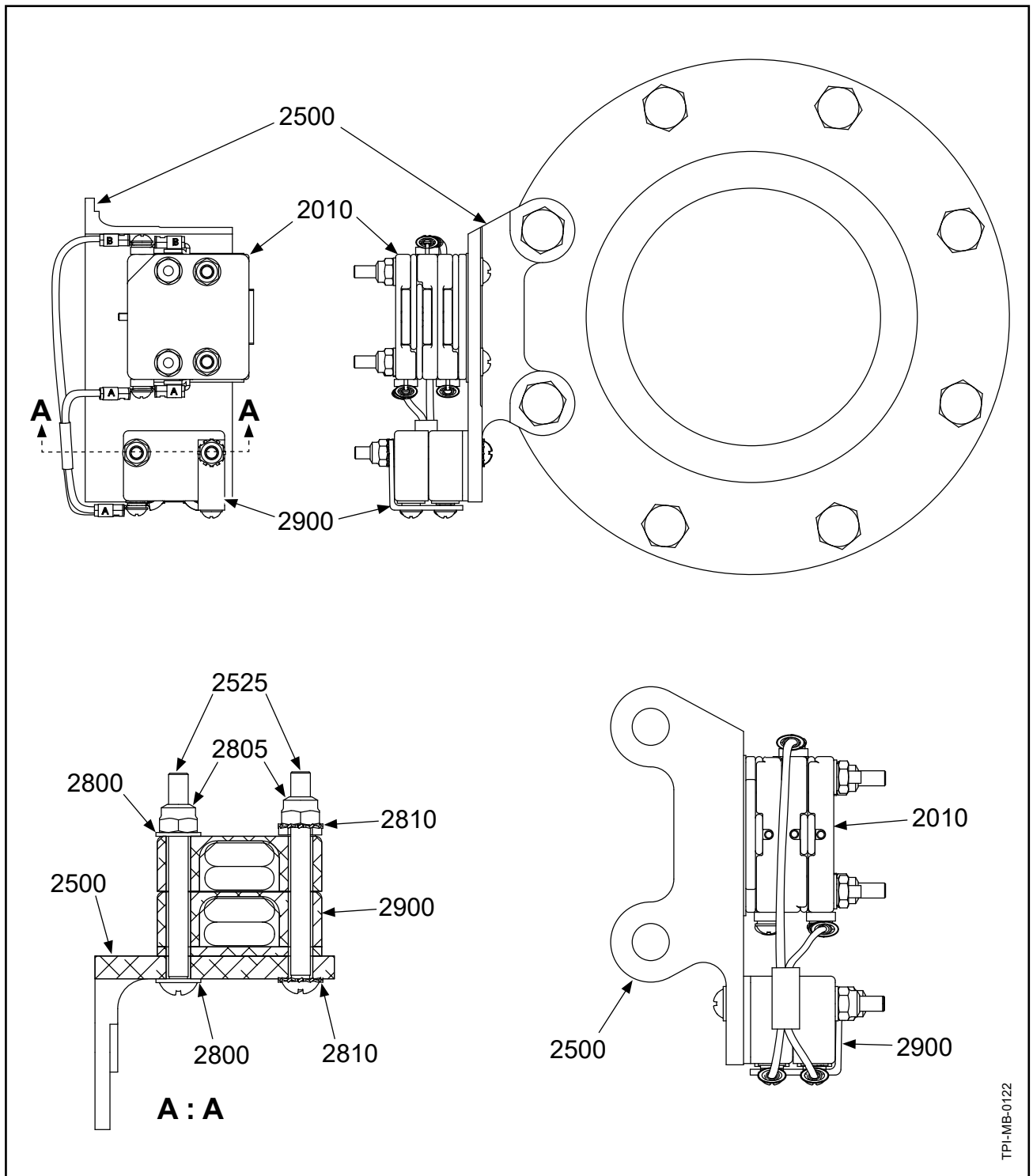


TPI-MB-0121

**Brush Block Installation  
Figure 12AK-1**

# **HARTZELL ICE PROTECTION SYSTEM MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**107595 and 107718**



**MOV Installation  
Figure 12AK-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**107595 and 107718**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>107595</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12AK FIGURES: 12AK-1 AND 12AK-2</b>		
2010	105404	• MODULAR BRUSH BLOCK ASSEMBLY	1	
2015	1H1157	• SHIM, BRUSH BLOCK	2	
2500	106335	• BRACKET, MOUNTING, BRUSH BLOCK	1	
2525	B-6637-52	• SCREW, 8-32, PAN HEAD, CRES	4	
2800	B-3837-N832	• WASHER, CORROSION RESISTANT	6	Y
2805	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
2810	B-3855-31	• WASHER, LOCK, EXTERNAL TOOTH	2	Y
2900	106340	• MOV MODULE - ASSEMBLY	1	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit(s): 107595**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

**107595 and 107718**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>107718</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12AK FIGURES: 12AK-1 AND 12AK-2</b>		
2010	105404	• MODULAR BRUSH BLOCK ASSEMBLY	2	
2015	1H1157	• SHIM, BRUSH BLOCK	4	
2500	107717	• BRACKET, MOUNTING, BRUSH BLOCK	2	
2525	B-6637-52	• SCREW, 8-32, PAN HEAD, CRES	8	
2800	B-3837-N832	• WASHER, CORROSION RESISTANT	12	Y
2805	B-6655-08	• NUT, HEX, SELF-LOCKING	8	Y
2810	B-3855-31	• WASHER, LOCK, EXTERNAL TOOTH	4	Y
2900	106340	• MOV MODULE - ASSEMBLY	2	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit(s): 107718**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**107595 and 107718**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

**107983(X)**

**AL.    Installation Instruction 12AL**

- (1) Install the airframe de-ice kit components in accordance with the applicable aircraft TC or STC holder's ICA.

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>107983(X)</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12AM</b>		
	102395	• ELECTRICAL CONNECTOR	2	
	102337	• TIMER/MONITOR	2	
	107826	• MODULAR BRUSH BLOCK ASSEMBLY	2	
	1H1157	• SHIM, BRUSH BLOCK	2	
	107979(X)	• BRACKET, MOUNTING, BRUSH BLOCK	2	
	B-6637-52	• SCREW, 8-32, PAN HEAD, CRES	8	
	B-3837-N832	• WASHER, CORROSION RESISTANT	12	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	8	Y
	B-3855-31	• WASHER, LOCK, EXTERNAL TOOTH	4	Y
	107981(X)	• MOV MODULE - ASSEMBLY	2	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit(s): 107983(X)**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**107983(X)**

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1000

**108005**

AM.

- (1)

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>108005</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12AM</b>		
	105404	• MODULAR BRUSH BLOCK ASSEMBLY	1	
	1H1157	• SHIM, BRUSH BLOCK	1	
	B-6637-52	• SCREW, 8-32, PAN HEAD, CRES	2	
	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	2	Y

**- ITEM NOT ILLUSTRATED**

**Airframe De-ice Kit(s): 108005**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**108005**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

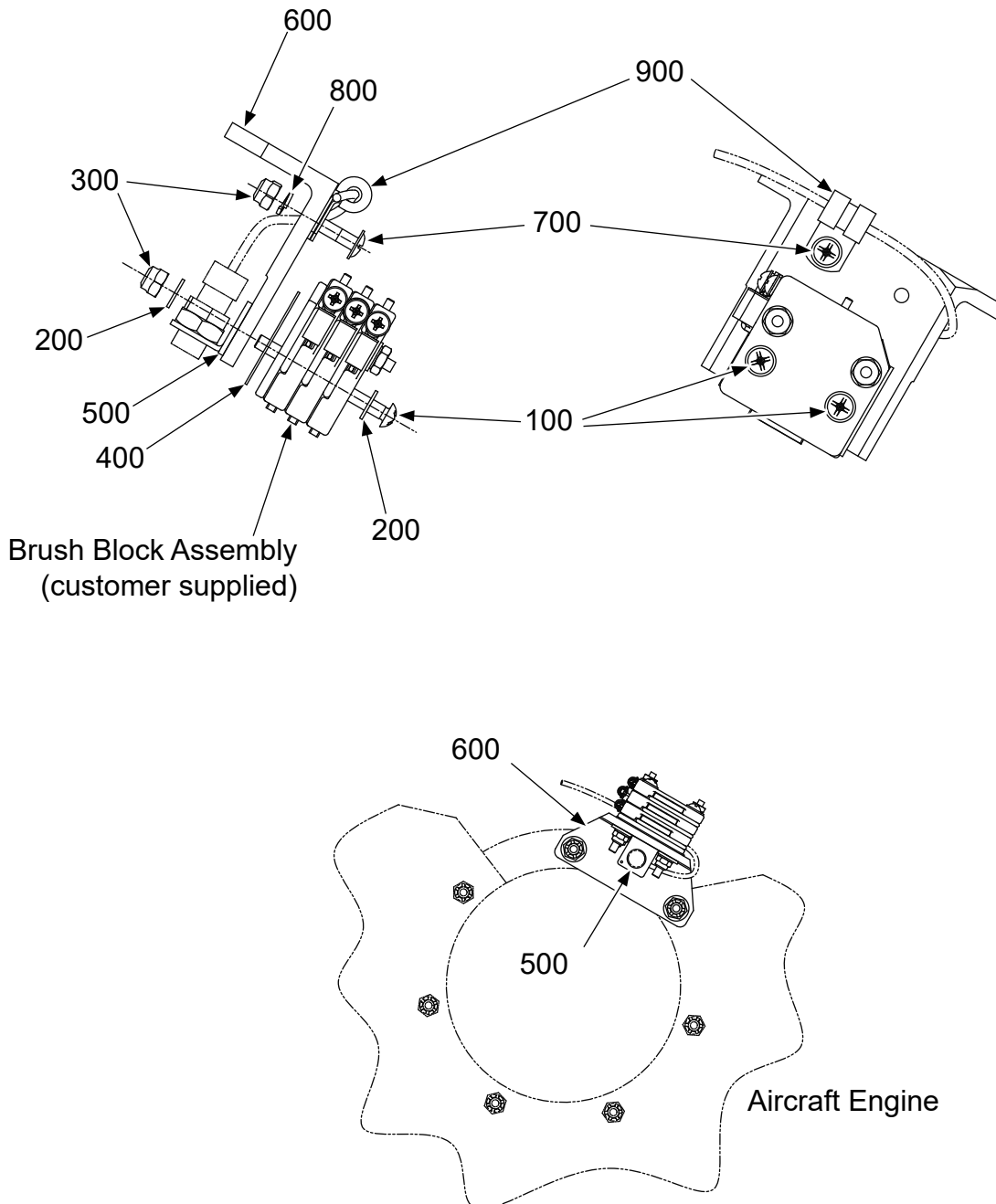
**107606**

AN. Installation Instruction 12AN

- (1) Using two screws (100), four washers (200), and two nuts (300), attach the brush block assembly (customer supplied), brush block shim (400), and the synchrophaser mounting bracket (500) to the brush block mounting bracket (600) as shown in Figure 12AN-1.
  - (a) Refer to the applicable STC installation or aircraft manufacturer's instructions for hardware torque specifications.
- (2) Using screw (700), lockwasher (800), and nut (300), attach the loop clamp (900) to the brush block mounting bracket (600) as shown in Figure 12AN-1.
- (3) Position the assembled brush block bracket (600) on the aircraft engine as shown in Figure 12AN-1.
  - (a) Refer to the airframe manufacturer's specification or applicable STC installation instructions for installation of the brush block mounting bracket (600) to the engine, and for the wiring of the brush block assembly to the aircraft.
- (4) Align brush block assembly (2010) to the slip ring assembly in accordance with the instructions in the Assembly chapter of this manual.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**107606**



TPI-MB-0415

**Brush Block Installation  
Figure 12AN-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

**107606**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>107606</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12AN FIGURE: 12AN-1</b>		
100	B-6637-52	• SCREW, 8-32, PAN HEAD, CRES	4	
200	B-3837-N832	• WASHER, CORROSION RESISTANT	8	Y
300	B-6655-08	• NUT, HEX, SELF-LOCKING	6	Y
400	1H1157	• SHIM, BRUSH BLOCK	2	
500	107725	• BRACKET, MOUNTING, SYNCHROPHASER	2	
600	107656	• BRACKET, MOUNTING, BRUSH BLOCK	2	
700	B-6976-10	• SCREW, 8-32, WASHER HEAD	2	Y
800	B-3854-42	• WASHER, LOCK	2	Y
900	B-3857-WDG3	• CLAMP, LOOP, CUSHIONED	2	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit(s): 107606**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**107606**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

**107949**

AO. Installation Instruction 12AO

- (1) Install the airframe de-ice kit components in accordance with the  
applicable aircraft TC or STC holder's ICA.

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>107949</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12AO</b>		
	103652	• AIRFRAME DE-ICE KIT	2	
	105070	• BRACKET, MOUNTING	2	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit: 107949**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

**107949**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

**103430**

**AP.    Installation Instruction 12AP**

- (1) Install the airframe de-ice kit components in accordance with the applicable aircraft TC or STC holder's ICA.

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>103430</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12AP</b>		
	108337	• BRACKET, MOUNTING, BRUSH BLOCK	1	
	3H2090-2	• MODULAR BRUSH BLOCK ASSEMBLY	1	
	1H1157	• SHIM, BRUSH BLOCK	2	
	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
	B-6637-51	• SCREW, 8-32, PAN HEAD, CRES.	2	
	B-6655-08	• NUT, HEX, SELF-LOCKING	2	Y
	102337	• TIMER/MONITOR	1	
	102395	• ELECTRICAL CONNECTOR	1	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit: 103430**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

**103430**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

**108423 and 108585**

**AQ. Installation Instruction 12AQ**

- (1) Install the airframe de-ice kit components in accordance with the applicable aircraft TC or STC holder's ICA.

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>108423</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12AQ</b>		
	103980	• BRACKET, MOUNTING, BRUSH BLOCK	1	
	3H2044-1	• MODULAR BRUSH BLOCK ASSEMBLY	1	
	1H1157	• SHIM, BRUSH BLOCK	1	
	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
	B-6637-52	• SCREW, PAN HEAD, CRES.	2	
	B-6655-08	• NUT, HEX, SELF-LOCKING	2	Y
	102337	• TIMER/MONITOR	1	
	102395	• ELECTRICAL CONNECTOR	1	
	<b>108585</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12AQ</b>		
	103401	• BRACKET, MOUNTING, BRUSH BLOCK	2	
	3H2044-1	• MODULAR BRUSH BLOCK ASSEMBLY	2	
	1H1157	• SHIM, BRUSH BLOCK	4	
	B-3837-N832	• WASHER, CORROSION RESISTANT	8	Y
	B-6637-52	• SCREW, PAN HEAD, CRES.	4	
	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
	102337	• TIMER/MONITOR	1	
	102395	• ELECTRICAL CONNECTOR	1	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit: 108423 and 108585**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**108423 and 108585**

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**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

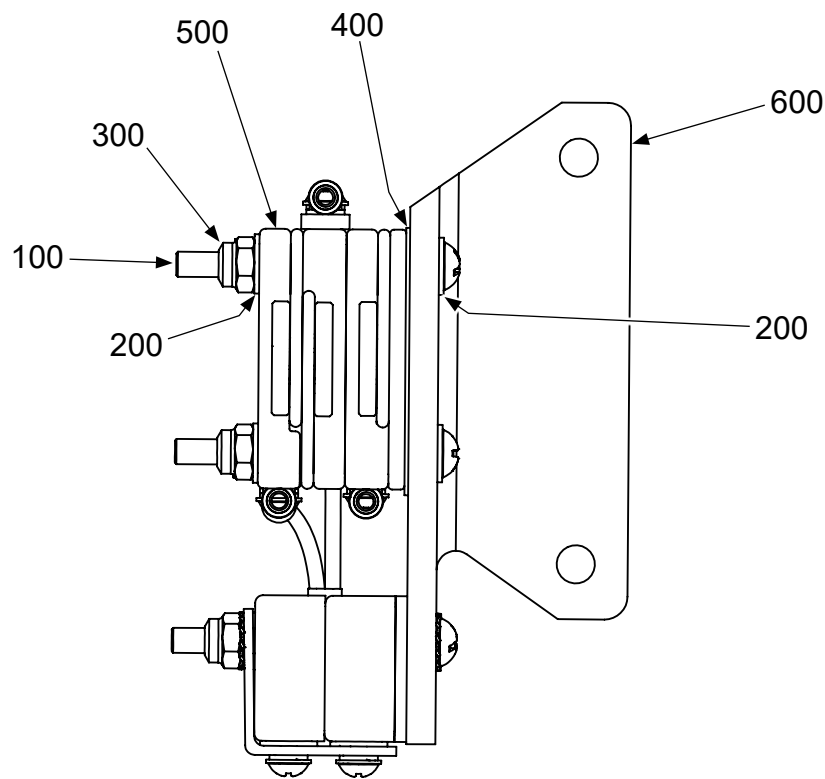
This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**108606**

AR. Installation Instruction 12AR

- (1) Using two screws (100), four washers (200), and two nuts (300), attach the brush block shim (400), and the brush block assembly (500) to the brush block mounting bracket (600) as shown in Figure 12AR-1.
  - (a) Torque each screw (100) to 22-25 In-Lbs (2.5-2.8 N•m).
- (2) Using two screws (100), two lockwashers (700), two washers (200), and two nuts (300), attach the MOV Module (800) to the brush block mounting bracket (600) as shown in Figure 12AR-2.
- (3) Attach MOV Module (800) "A" wire to "A" brush block terminal (outboard).
- (4) Attach MOV Module (800) "B" wire to "B" brush block terminal (inboard).
- (5) Refer to the airframe manufacturer's specification or applicable STC installation instructions for installation of the brush block mounting bracket (600) to the engine, and for the wiring of the brush block assembly (500) and the MOV module (800) to the aircraft.

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**108606**

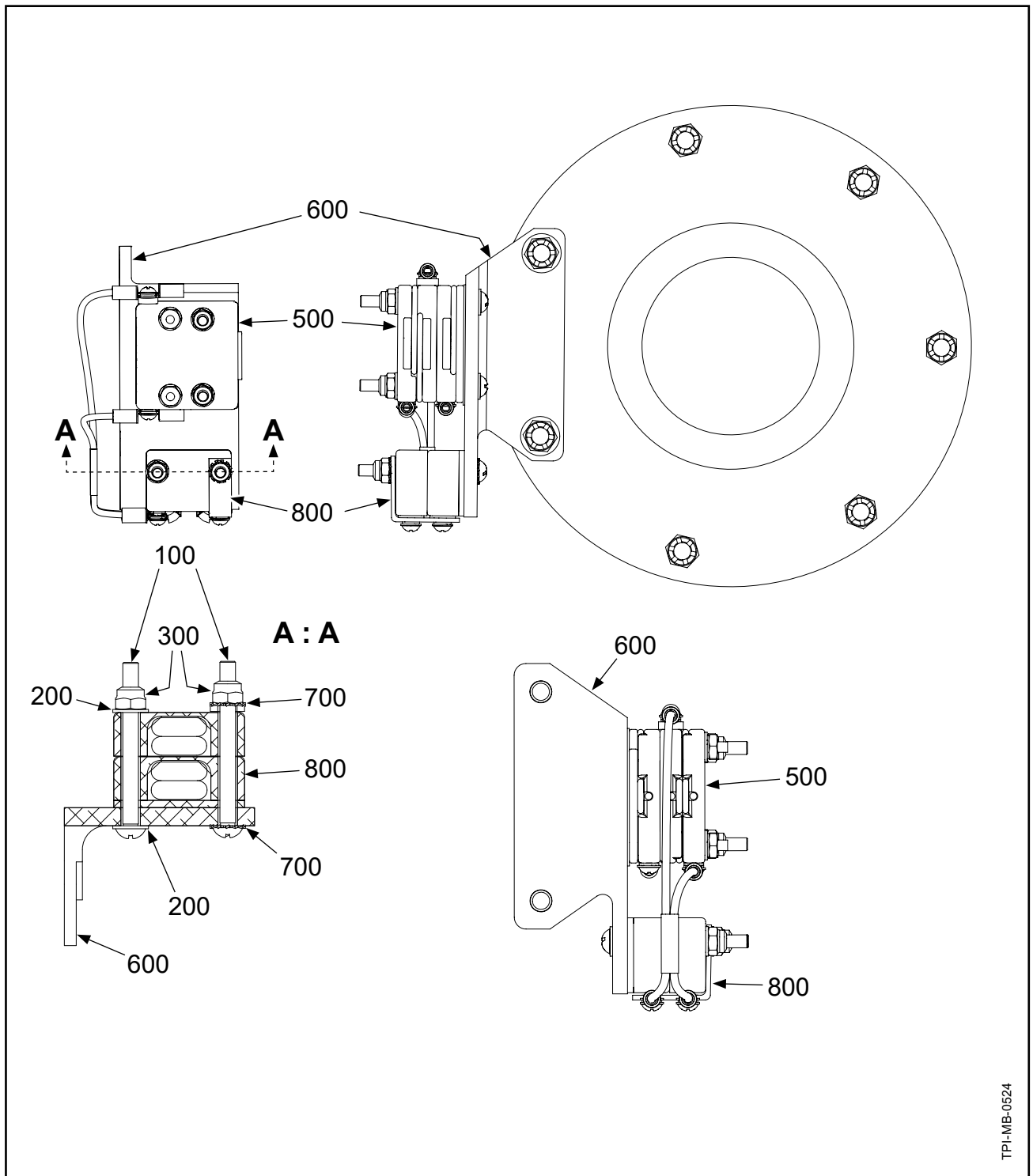


TPI-MB-0525

**Brush Block Installation  
Figure 12AR-1**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**108606**



**MOV Installation  
Figure 12AR-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**108606**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>108606</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12AR FIGURES: 12AR-1 AND 12AR-2</b>		
100	B-6637-52	• SCREW, 8-32, PAN HEAD, CRES	8	
200	B-3837-N832	• WASHER, CORROSION RESISTANT	12	Y
300	B-6655-08	• NUT, HEX, SELF-LOCKING	8	Y
400	1H1157	• SHIM, BRUSH BLOCK	4	
500	105404	• MODULAR BRUSH BLOCK ASSEMBLY	2	
600	108600	• BRACKET, MOUNTING, BRUSH BLOCK	2	
700	B-3855-31	• WASHER, LOCK, EXTERNAL TOOTH	4	Y
800	106340	• MOV MODULE - ASSEMBLY	2	
900	106996	• TIMER, DE-ICE 3H1150-10 WITHOUT RAILS AND ATTACHMENT HARDWARE	2	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit(s): 108606**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**7931-5E2689-2**

AS. Installation Instruction 12AS

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 5E2689 Rev. A

1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

- a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)
- b Hartzell Propeller Service Letter HC-SL-30-259
- c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**7931-5E2689-2**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-5E2689-2</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12AS</b>		
	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
	B-6637-52	• SCREW, 8-32, PAN HEAD, CRES.	4	
	B-3874-42A	• BOLT, 1/4-28, HEX HEAD	2	
	B-3837-N832	• WASHER, CORROSION RESISTANT	8	Y
	B-3837-0463	• WASHER, CORROSION RESISTANT	4	Y
	7931-91586-1	• MS91586-1 AMMETER SHUNT 30 AMP	1	
	7931-4E2032	• DE-ICE MOUNTING BRACKET	2	
	3H2042-1	• MODULAR BRUSH BLOCK ASSEMBLY	2	
	7931-3E2042-1	• MODULAR BRUSH BLOCK ASSY ALTERNATE FOR 3H2042-1	2	
	7931-3E1935	• SUPPORT ARM ASSEMBLY	2	
	3H1872-2	• AMMETER, 14-18 AMPS	1	
	7931-3E1872-2	• AMMETER, 14-18 AMPS ALTERNATE FOR 3H1872-2	1	
	7931-3E1150-12	• TIMER	1	
	1H1157	• SHIM, BRUSH BLOCK	2	
	7931-1E1157	• SHIM, BRUSH BLOCK ASSY ALTERNATE FOR 1H1157	2	
	1H1111	• SWITCH, FACE PLATE	1	
	7931-1E1111	• SWITCH, FACE PLATE ALTERNATE FOR 1H1111	1	
	1H1110-1	• CIRCUIT BREAKER, SWITCH	1	
	7931-1E1110-1	• SWITCH, CIRCUIT BREAKER 20 AMPS ALTERNATE FOR 1H1110-1	1	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit(s): 7931-5E2689-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**7931-65-530-2**

AT. Installation Instruction 12AT

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 7E1601 Rev. C

1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

- a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)
- b Hartzell Propeller Service Letter HC-SL-30-259
- c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**7931-65-530-2**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-65-530-2</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12AT</b>		
	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
	B-6637-52	• SCREW, 8-32, PAN HEAD, CRES.	4	
	B-3837-N832	• WASHER, CORROSION RESISTANT	28	Y
	3H2044-1	• MODULAR BRUSH BLOCK ASSEMBLY	2	
	7931-3E2044-1	• MODULAR BRUSH BLOCK ASSY ALTERNATE FOR 3H2044-1	2	
	7931-3E1219-4	• AMMETER, DE-ICE	1	
	3H1150-10	• TIMER	1	
	7931-3E1150-10	• TIMER ALTERNATE FOR 3H1150-10	1	
	1H1157	• SHIM, BRUSH BLOCK	2	
	7931-1E1157	• SHIM, BRUSH BLOCK ASSY ALTERNATE FOR 1H1157	2	
	1H1111	• SWITCH, FACE PLATE	1	
	7931-1E1111	• SWITCH, FACE PLATE ALTERNATE FOR 1H1111	1	
	1H1110-1	• CIRCUIT BREAKER, SWITCH	1	
	7931-1E1110-1	• SWITCH, CIRCUIT BREAKER 20 AMPS ALTERNATE FOR 1H1110-1	1	
	7931-3E1418-3	• BRACKET, MOUNTING, BRUSH BLOCK	2	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit(s): 7931-65-530-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**7931-65-610-2**

AU. Installation Instruction 12AU

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 5E2613 Rev. A

1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

- a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)
- b Hartzell Propeller Service Letter HC-SL-30-259
- c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**7931-65-610-2**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-65-610-2</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12AU</b>		
	B-7077-52	• BELLEVILLE SPRING WASHER	6	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	2	Y
	B-6637-52	• SCREW, 8-32, PAN HEAD, CRES.	2	
	B-3875-25A	• BOLT, 5/16-24, HEX HEAD	2	
	B-3837-N832	• WASHER, CORROSION RESISTANT	4	Y
	B-3837-0432	• WASHER, CORROSION RESISTANT	6	Y
	B-3808-4	• NUT, HEX, SELF-LOCKING	6	Y
	B-3384-7H	• BOLT, 1/4-28, HEX HEAD	6	Y
	7931-91586-1	• MS91586-1 AMMETER SHUNT 30 AMP	1	
	7931-68-04-714	• BRUSH BLOCK O/H MAN.	1	
	7931-68-04-712	• 68-04-712 INSTL. & MAINT. MANUAL	1	
	7931-59-728	• DE-ICE INSTL. REPORT	1	
	4H2459-2	• SLIP RING ASSEMBLY	1	
	7931-4E2459-2	• SLIP RING ASSEMBLY ALTERNATE FOR 4H2459-2	1	
	4H3174	• PLATE, MOUNTING, SPLIT	2	
	7931-4E2058	• PLATE, MOUNTING, SPLIT, DE-ICE ALTERNATE FOR 4H3174	2	
	3H2042-1	• MODULAR BRUSH BLOCK ASSEMBLY	1	
	7931-3E2042-1	• MODULAR BRUSH BLOCK ASSY ALTERNATE FOR 3H2042-1	1	
	7931-3E1964-1	• TIMER, DE-ICE	1	
	3H1461	• BRACKET, MOUNTING, BRUSH BLOCK	1	
	7931-3E1461	• BRACKET, MOUNTING, BRUSH BLOCK ALTERNATE FOR 3H1461	1	
	3H1389-2	• AMMETER, 14-18 AMPS	1	
	7931-3E1389-2	• AMMETER, 14-18 AMPS ALTERNATE FOR 3H1389-2	1	
	1H1211	• SPACER	4	
	7931-1E1211	• SPACER, E.P.D. SYSTEM (CE-320) ALTERNATE FOR 1H1211	4	
	1H1157	• SHIM, BRUSH BLOCK	1	
	7931-1E1157	• SHIM, BRUSH BLOCK ASSY ALTERNATE FOR 1H1157	1	
	1H1111	• SWITCH, FACE PLATE	1	
	7931-1E1111	• SWITCH, FACE PLATE ALTERNATE FOR 1H1111	1	
	1H1110-1	• CIRCUIT BREAKER SWITCH	1	
	7931-1E1110-1	• SWITCH, CIRCUIT BREAKER 20 AMPS ALTERNATE FOR 1H1110-1	1	
	108987	• ELECTRICAL CONNECTOR	1	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit(s): 7931-65-610-2**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**7931-67-835-2**

AV. Installation Instruction 12AV

- (1) Refer to the de-ice kit installation instructions on the following  
Goodrich Corporation drawing(s):

- (a) 7E1781 Rev. C

1 Refer to the following Hartzell Propeller LLC documents for  
cross-reference information about Goodrich Corporation part  
numbers:

- a The Vendor Cross-Reference chapter of Hartzell Propeller  
Standard Practices Manual 202A (61-01-02)
- b Hartzell Propeller Service Letter HC-SL-30-259
- c Hartzell Propeller Service Letter HC-SL-30-260

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**7931-67-835-2**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>7931-67-835-2</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12AV</b>		
	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
	7931-3E2298	• 3E2298 BRACKET	2	
	1H1157	• SHIM, BRUSH BLOCK	4	
	7931-1E1157	• SHIM, BRUSH BLOCK ASSY ALTERNATE FOR 1H1157	4	
	7931-3H2346-2	• MODULAR BRUSH ASSEMBLY	2	
	B-6637-52	• SCREW, 8-32, PAN HEAD, CRES.	4	
	B-3837-N832	• WASHER, CORROSION RESISTANT	8	Y
	3H1964-3	• TIMER DE-ICE	1	
	7931-3E1964-3	• TIMER, DE-ICE ALTERNATE FOR 3H1964-3	1	
	7931-3E1219-2	• AMMETER, DE-ICE	1	
	7931-1E1140	• SWITCH, CIRCUIT BREAKER 25 AMPS	1	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit(s): 7931-67-835-2**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):

**109546**

**AW. Installation Instruction 12AW**

- (1) Install the airframe de-ice kit components in accordance with the applicable aircraft TC or STC holder's ICA.

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	UPA	O/H
	<b>109546</b>	<b>AIRFRAME DE-ICE KIT INSTALLATION INSTRUCTION 12AW</b>		
	103044-1	• BRACKET, MOUNTING, BRUSH BLOCK	2	
	3H2090-2	• MODULAR BRUSH BLOCK ASSEMBLY	2	
	B-6637-51	• SCREW, 8-32, PAN HEAD, CRES	4	
	B-3837-N832	• WASHER, CORROSION RESISTANT	8	Y
	B-6655-08	• NUT, HEX, SELF-LOCKING	4	Y
	1H1157	• SHIM, BRUSH BLOCK	4	

- ITEM NOT ILLUSTRATED

**Airframe De-ice Kit(s): 109546**

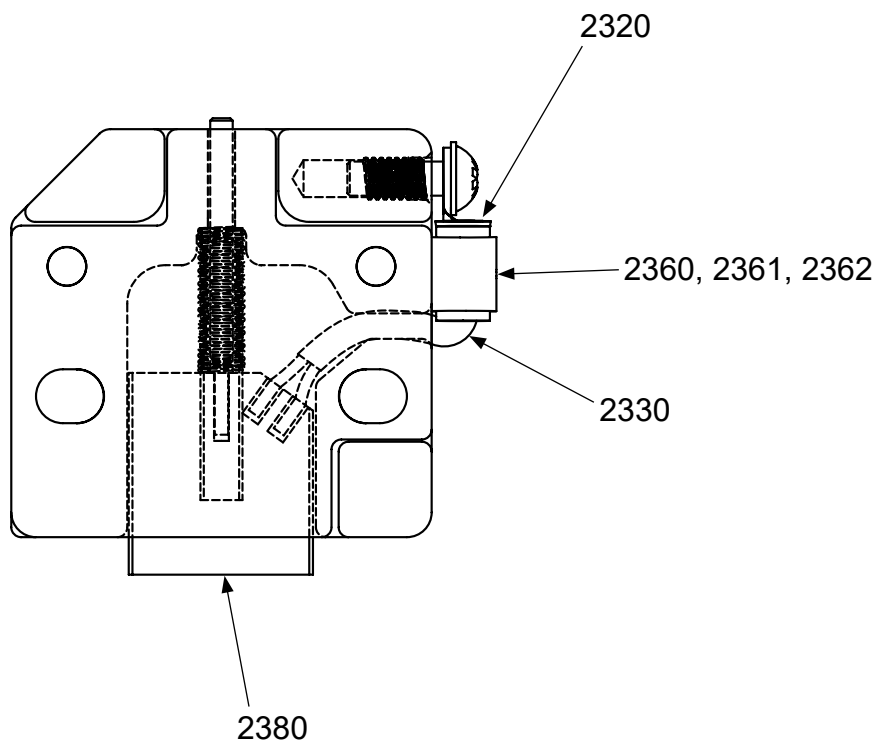
**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

This section includes the parts list(s) and installation instructions  
for the following airframe de-ice kit(s):  
**109546**

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## APPENDIX

### 1. Brush Block Assemblies



TPI-TI-180 brush.tif

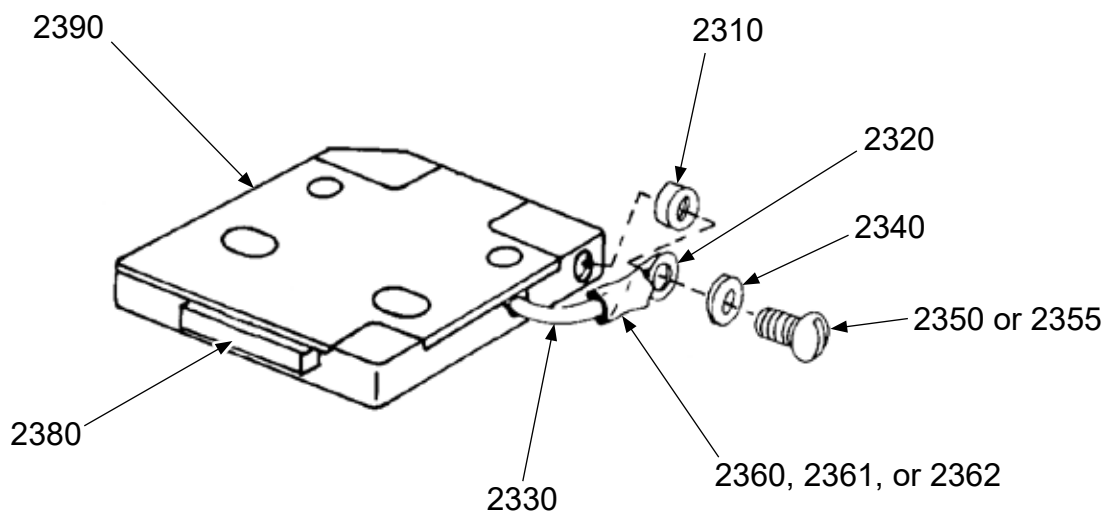
Brush Assembly: 3H1443-7  
Figure: App-1

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H
<b>APP-1</b>	<b>3H1443-7</b>	<b>BRUSH ASSEMBLY</b>			
	2320	• TERMINAL, RING		1	
	2320A	• AMP 320619 PIDG RING TERMINAL ALTERNATE FOR ITEM 2320		1	
	2330	• SILICONE TUBING		1	
	2360	• WIRE MARKER "A"		1	
	2361	• WIRE MARKER "B"		1	
	2362	• WIRE MARKER "C"		1	
	2380	• BRUSH ASSEMBLY		1	

- ITEM NOT ILLUSTRATED

**Brush Assembly: 3H1443-7**



TPI-TI-180 brush.tif

Brush Module Assembly: 3H2011-()  
Figure: App-2

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H
<b>APP-2</b>	<b>3E2011-(1,2,3)</b> <b>3H2011-(1,2,3)</b>	<b>BRUSH MODULE ASSEMBLY, SUPERSEDED BY 3H2011-(1,2,3)</b> <b>BRUSH MODULE ASSEMBLY, SUPERSEDES 3E2011-(1,2,3)</b>			
	2310 7931-2E1260	• INSULATING BUSHING SUPERSEDED BY ITEM 2310A	1,2	1	
	2310A 2H1260	• INSULATING BUSHING SUPERSEDES ITEM 2310	1,2	1	
	2340 B-3864-37	• LOCK WASHER	1,2,3	1	Y
	2350 MS35333-26	• SCREW, SUPERSEDED BY ITEM 2350A	1,2,3	1	
	2350A 101864-26	• SCREW, SUPERSEDES ITEM 2350	1,2,3	1	
	2355 MS35333-27	• SCREW, SUPERSEDED BY ITEM 2355A	1,2,3	1	
	2355A 101864-27	• SCREW, SUPERSEDES ITEM 2355	1,2,3	1	
	2390 102633	• HOUSING	1,2,3	1	
	2380 3E1443-6	• BRUSH, SUPERSEDED BY ITEM 2380A	1,2,3	1	
	2380A 3H1443-7	• BRUSH, SUPERSEDES ITEM 2380	1,2,3	1	
	2320 101902	• • TERMINAL, RING	1,2,3	1	
	2320A AMP 320619	• • RING TERMINAL, ALTERNATE FOR ITEM 2320	1,2,3	1	
	2320B 7931-320619	• • AMP 320619 PIDG RING TERMINAL ALTERNATE FOR ITEM 2320	1,2,3	1	
	2330 1258-2 #14	• • SILICONE TUBING, BEN HAR, SUPERSEDED BY ITEM 2330A	1,2,3	1	
	2330A 108493	• • SILICONE TUBING, SUPERSEDES ITEM 2330	1,2,3	1	
	2360	• • WIRE MARKER "A", SUPERSEDED BY ITEM 2360A	1	1	
	2360A A-6741-212-A	• • WIRE MARKER "A", SUPERSEDES ITEM 2360	1	1	
	2361	• • WIRE MARKER "B", SUPERSEDED BY ITEM 2361A	2	1	
	2361A A-6741-212-B	• • WIRE MARKER "B", SUPERSEDES ITEM 2361	1	1	
	2362	• • WIRE MARKER "C", SUPERSEDED BY ITEM 2362A	3	1	
	2362A A-6741-212-C	• • WIRE MARKER "C", SUPERSEDES ITEM 2362	1	1	
EFFECTIVITY		MODEL			
1 -		3(E,H)2011-1			
2 -		3(E,H)2011-2			
3 -		3(E,H)2011-3			

- ITEM NOT ILLUSTRATED

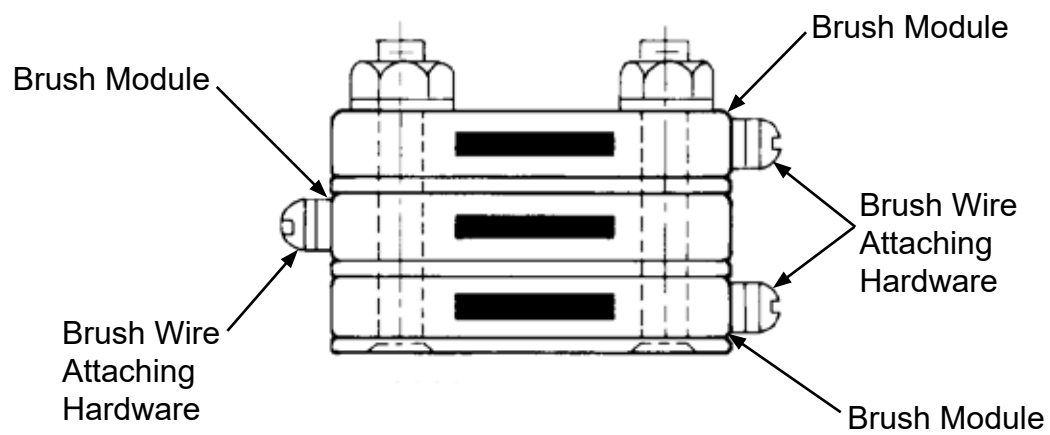
## Brush Module Assemblies: 3E2011-(1,2,3) and 3H2011-(1,2,3)

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H
<b>APP-2</b>	<b>3H2011-10</b>	<b>UNIVERSAL BRUSH MODULE ASSEMBLY</b> SUPERSEDES 3E2011-10			
	2310	2H1260		1	
	2320	101902		1	
	2320A	7931-320619		1	
		ALTERNATE FOR ITEM 2320			
	2330	108493		1	
	2340	B-3864-37		1	Y
	2350	101864-26		1	
	2355	101864-27		1	
	2360	A-6741-212-A		1	
	2361	A-6741-212-B		1	
	2362	A-6741-212-C		1	
	2380	3H1443-6		1	
	2390	102633		1	

- ITEM NOT ILLUSTRATED

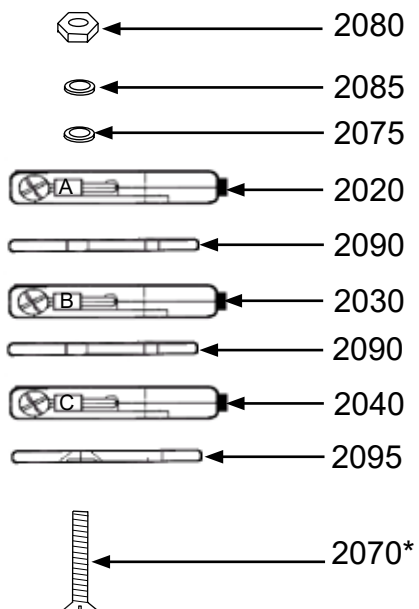
**Universal Brush Module Assembly: 3H2011-10**



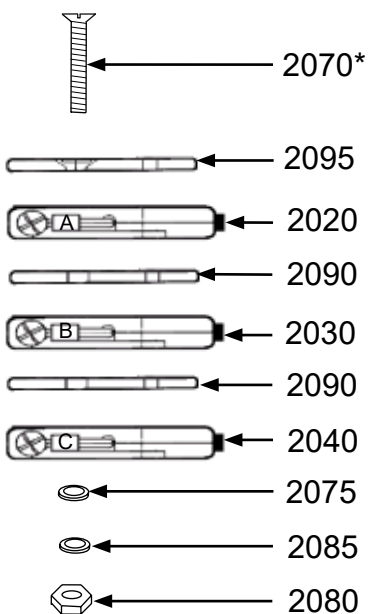
**Brush Block Assembly: Alternate Configuration**  
**Figure: App-3**



# HARTZELL ICE PROTECTION SYSTEM MANUAL 180



## **3H2042-1 Assembly**



## **3H2042-2 Assembly**

\*Tighten until snug.

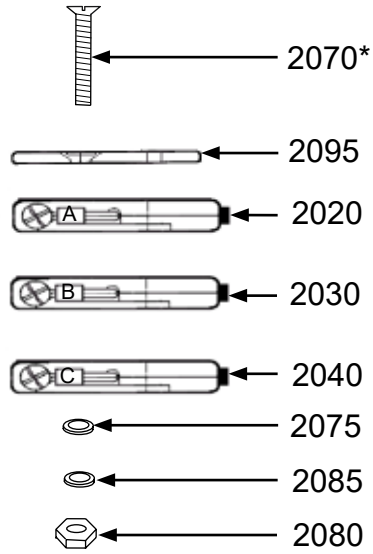
**Brush Block Assemblies: 3H2042-1 and 3H2042-2**  
**Figure: App-4**

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

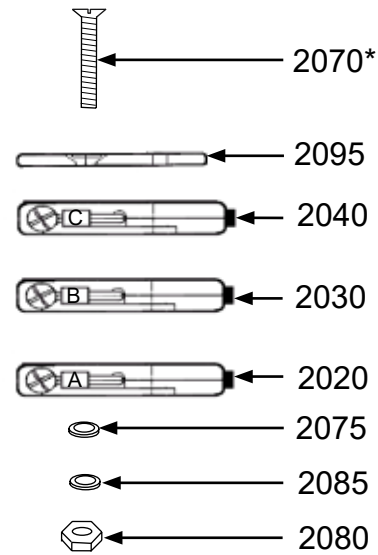
FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H
APP-3 APP-4	3H2042-1	<b>BRUSH BLOCK ASSEMBLY</b> POST HC-SL-30-260			
	2020	• BRUSH MODULE ASSEMBLY "A", SUPERSEDED BY ITEM 2020A		1	
	2020A	• BRUSH MODULE ASSEMBLY "A", SUPERSEDES ITEM 2020		1	
	2030	• BRUSH MODULE ASSEMBLY "B", SUPERSEDED BY ITEM 2030A		1	
	2030A	• BRUSH MODULE ASSEMBLY "B", SUPERSEDES ITEM 2030		1	
	2040	• BRUSH MODULE ASSEMBLY "C", SUPERSEDED BY ITEM 2040A		1	
	2040A	• BRUSH MODULE ASSEMBLY "C", SUPERSEDES ITEM 2040		1	
	2070	• SCREW, 6-32, 100 DEG HEAD		2	
	2075	• WASHER, CORROSION RESISTANT		2	Y
	2080	• NUT, 6-32, HEX, STEEL2			
	2085	• WASHER, LOCK, INTERNAL TOOTH		2	Y
	2090	• SPACER, SUPERSEDED BY ITEM 2090A		2	
	2090A	• SPACER, SUPERSEDES ITEM 2090		2	
	2095	• SPACER, SUPERSEDED BY ITEM 2095A		1	
	2095A	• SPACER, SUPERSEDES ITEM 2095		1	
APP-3 APP-4	3H2042-2	<b>BRUSH BLOCK ASSEMBLY</b> POST HC-SL-30-260			
	2020	• BRUSH MODULE ASSEMBLY "A", SUPERSEDED BY ITEM 2020A		1	
	2020A	• BRUSH MODULE ASSEMBLY "A", SUPERSEDES ITEM 2020		1	
	2030	• BRUSH MODULE ASSEMBLY "B", SUPERSEDED BY ITEM 2030A		1	
	2030A	• BRUSH MODULE ASSEMBLY "B", SUPERSEDES ITEM 2030		1	
	2040	• BRUSH MODULE ASSEMBLY "C", SUPERSEDED BY ITEM 2040A		1	
	2040A	• BRUSH MODULE ASSEMBLY "C", SUPERSEDES ITEM 2040		1	
	2070	• SCREW, 6-32, 100 DEG HEAD		2	
	2075	• WASHER, CORROSION RESISTANT		2	Y
	2080	• NUT, 6-32, HEX, STEEL2			
	2085	• WASHER, LOCK, INTERNAL TOOTH		2	Y
	2090	• SPACER, SUPERSEDED BY ITEM 2090A		2	
	2090A	• SPACER, SUPERSEDES ITEM 2090		2	
	2095	• SPACER, SUPERSEDED BY ITEM 2095A		1	
	2095A	• SPACER, SUPERSEDE ITEMS 2095		1	

- ITEM NOT ILLUSTRATED

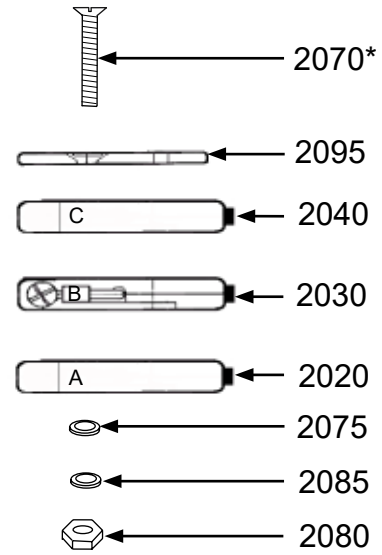
## Brush Block Assemblies: 3H2042-1 and 3H2042-2



**3H2044-1 Assembly**



**3H2044-3 Assembly**



**3H2044-4 Assembly**

\*Tighten until snug.

**Brush Block Assemblies: 3H2044-1, 3H2044-3, and 3H2044-4**  
**Figure: App-5**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H
APP-3 APP-5	3H2044-1	<b>BRUSH BLOCK ASSEMBLY</b> POST HC-SL-30-260			
	2020	3E2011-1		1	
	2020A	3H2011-1		1	
	2030	3E2011-2		1	
	2030A	3H2011-2		1	
	2040	3E2011-3		1	
	2040A	3H2011-3		1	
	2070	B-3871-S34		2	
	2075	B-3837-N632		2	Y
	2080	101964-262		2	
	2085	B-3864-37		2	Y
	2095	4E2218-4		1	
	2095A	4H2218-4		1	
	3H2044-3	<b>BRUSH BLOCK ASSEMBLY</b> POST HC-SL-30-260			
APP-3 APP-5	2020	3E2011-1		1	
	2020A	3H2011-1		1	
	2030	3E2011-2		1	
	2030A	3H2011-2		1	
	2040	3E2011-3		1	
	2040A	3H2011-3		1	
	2070	B-3871-S34		2	
	2075	B-3837-N632		2	Y
	2080	101964-262		2	
	2085	B-3864-37		2	Y
	2095	4E2218-4		1	
	2095A	4H2218-4		1	

- ITEM NOT ILLUSTRATED

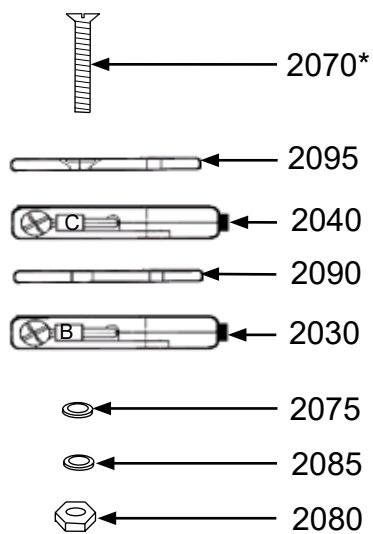
**Brush Block Assemblies: 3H2044-1 and 3H2044-3**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H
<b>APP-5</b>	<b>3H2044-4</b>	<b>BRUSH BLOCK ASSEMBLY</b>			
2020	3H2011-1	• BRUSH MODULE ASSEMBLY "A"		1	
2030	3H2011-2	• BRUSH MODULE ASSEMBLY "B"		1	
2040	3H2011-3	• BRUSH MODULE ASSEMBLY "C"		1	
2070	B-3871-S34	• SCREW, 6-32, 100 DEG HEAD		2	
2075	B-3837-N632	• WASHER, CORROSION RESISTANT		2	Y
2080	101964-262	• NUT, 6-32, HEX, STEEL		2	
2085	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH		2	Y
2095	4H2218-4	• SPACER		1	

- ITEM NOT ILLUSTRATED

**Brush Block Assembly: 3H2044-4**



**3H2062-2 Assembly**

\*Tighten until snug.

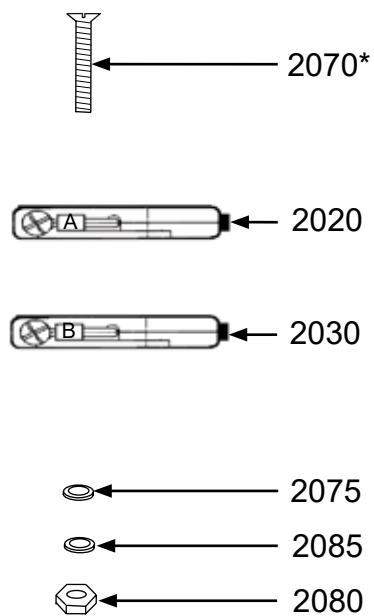
**Brush Block Assembly: 3H2062-2**  
**Figure: App-6**

**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H
<b>APP-6</b>	<b>3H2062-2</b>	<b>BRUSH BLOCK ASSEMBLY</b> POST HC-SL-30-260			
	2030	3E2011-2		1	
	2030A	3H2011-2		1	
	2040	3E2011-3		1	
	2040A	3H2011-3		1	
	2070	B-3871-S32		2	
	2075	B-3837-N632		2	Y
	2080	101964-262		2	
	2085	B-3864-37		2	Y
	2090	4E2218-3		1	
	2090A	4H2218-3		1	
	2095	4E2218-4		1	
	2095A	4H2218-4		1	

- ITEM NOT ILLUSTRATED

**Brush Block Assembly: 3H2062-2**



**3H2071 Assembly**

\*Tighten until snug.

**Brush Block Assembly: 3H2071**  
**Figure: App-7**

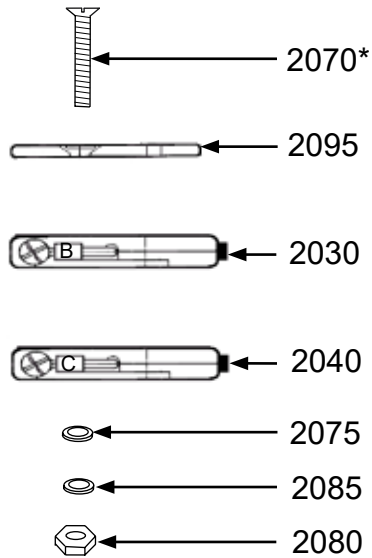


**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

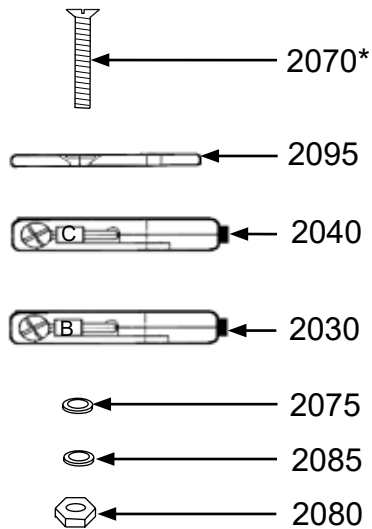
FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H
APP-7	3H2071	<b>BRUSH BLOCK ASSEMBLY</b> POST HC-SL-30-260			
	2020	3E2011-1		1	
	2020A	3H2011-1		1	
	2030	3E2011-2		1	
	2030A	3H2011-2		1	
	2070	B-3871-S34		2	
	2075	B-3837-N632		2	Y
	2080	101964-262		2	
	2085	B-3864-37		2	Y
	2300	4E2218-6		1	
	2300A	4H2218-6		1	

- ITEM NOT ILLUSTRATED

**Brush Block Assembly: 3H2071**



### 3H2090-1 Assembly



### 3H2090-2 Assembly

\*Tighten until snug.

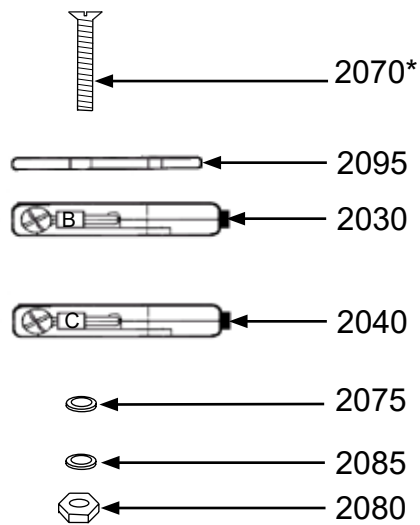
**Brush Block Assemblies: 3H2090-1 and 3H2090-2**  
**Figure: App-8**

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H
<b>APP-8</b>	<b>3H2090-1</b>	<b>BRUSH BLOCK ASSEMBLY</b> POST HC-SL-30-260			
	2030	3E2011-2		1	
	2030A	3H2011-2		1	
	2040	3E2011-3		1	
	2040A	3H2011-3		1	
	2070	B-3871-S32		2	
	2075	B-3837-N632		2	Y
	2080	101964-262		2	
	2085	B-3864-37		2	Y
	2095	4E2218-4		1	
	2095A	4H2218-4		1	
<b>APP-8</b>	<b>3H2090-2</b>	<b>BRUSH BLOCK ASSEMBLY</b> POST HC-SL-30-260			
	2030	3E2011-2		1	
	2030A	3H2011-2		1	
	2040	3E2011-3		1	
	2040A	3H2011-3		1	
	2070	B-3871-S32		2	
	2075	B-3837-N632		2	Y
	2080	101964-262		2	
	2085	B-3864-37		2	Y
	2095	4E2218-4		1	
	2095A	4H2218-4		1	

- ITEM NOT ILLUSTRATED

## Brush Block Assemblies: 3H2090-1 and 3H2090-2



**102354 Assembly**

\*Tighten until snug.

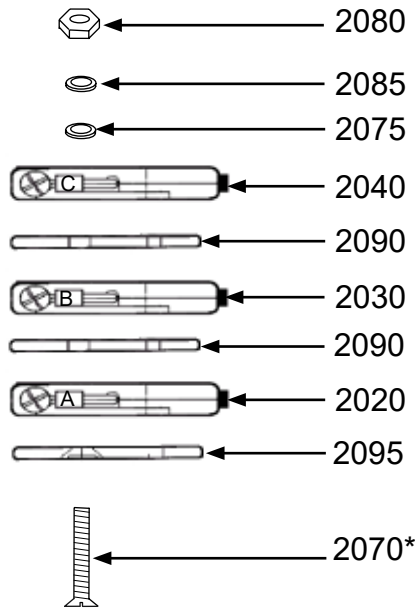
**Brush Block Assembly: 102354**  
**Figure: App-9**

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H
<b>APP-9</b>	<b>102354</b>	<b>BRUSH BLOCK ASSEMBLY</b>			
2030	3E2011-2	• BRUSH MODULE ASSEMBLY "B", SUPERSEDED BY ITEM 2030A		1	
2030A	3H2011-2	• BRUSH MODULE ASSEMBLY "B", SUPERSEDES ITEM 2030		1	
2040	3E2011-3	• BRUSH MODULE ASSEMBLY "C", SUPERSEDED BY ITEM 2040A		1	
2040A	3H2011-3	• BRUSH MODULE ASSEMBLY "C", SUPERSEDES ITEM 2040		1	
2070	B-3871-S32	• SCREW, 6-32, 100 DEG HEAD		2	
2075	B-3837-N632	• WASHER, CORROSION RESISTANT		2	Y
2080	101964-262	• NUT, 6-32, HEX, STEEL		2	
2085	B-3864-37	• WASHER, LOCK, INTERNAL TOOTH		2	Y
2095	4E2218-4	• SPACER, SUPERSEDED BY ITEM 2095A		1	
2095A	4H2218-4	• SPACER, SUPERSEDES ITEM 2095		1	
2310	2H1260	• BUSHING, INSULATING		1	
2350	101864-27	• SCREW, 6-32, PAN HEAD, BRASS		1	

- ITEM NOT ILLUSTRATED

**Brush Block Assembly: 102354**



**103158 Assembly**

\*Tighten until snug.

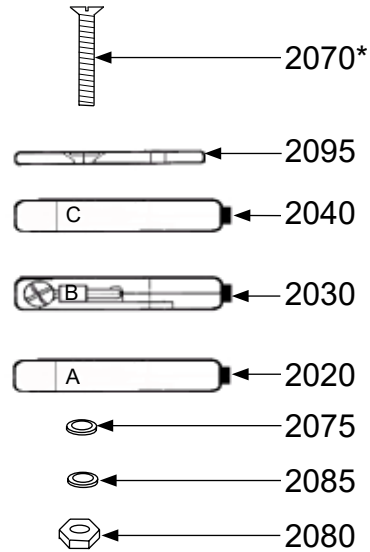
**Brush Block Assembly: 103158**  
**Figure: App-10**

# HARTZELL ICE PROTECTION SYSTEM MANUAL 180

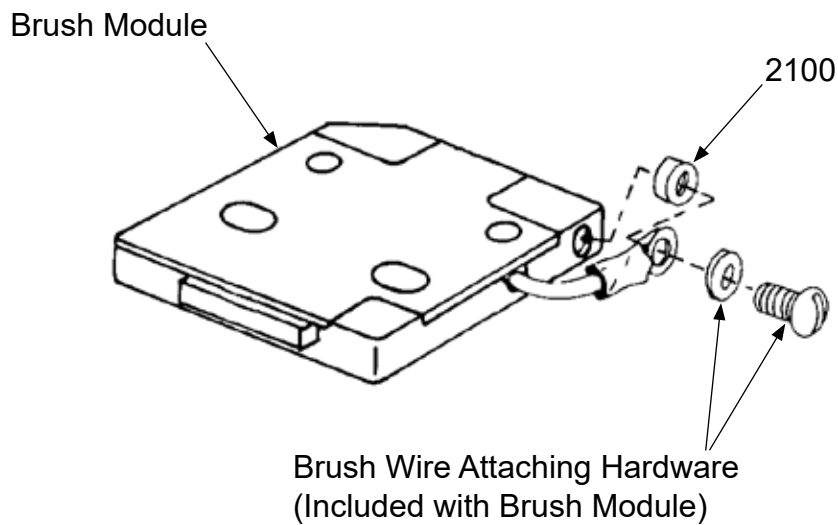
FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H
<b>APP-3</b>	<b>103158</b>	<b>BRUSH BLOCK ASSEMBLY</b>			
<b>APP-10</b>					
2020	3E2011-1	•BRUSH MODULE ASSEMBLY "A", SUPERSEDED BY ITEM 2020A		1	
2020A	3H2011-1	•BRUSH MODULE ASSEMBLY "A", SUPERSEDES ITEM 2020		1	
2030	3E2011-2	•BRUSH MODULE ASSEMBLY "B", SUPERSEDED BY ITEM 2030A		1	
2030A	3H2011-2	•BRUSH MODULE ASSEMBLY "B", SUPERSEDES ITEM 2030		1	
2040	3E2011-3	•BRUSH MODULE ASSEMBLY "C", SUPERSEDED BY ITEM 2040A		1	
2040A	3H2011-3	•BRUSH MODULE ASSEMBLY "C", SUPERSEDES ITEM 2040		1	
2070	B-3871-S35	•SCREW, 6-32, 100 DEG HEAD		2	
2075	B-3837-N632	•WASHER, CORROSION RESISTANT		2	Y
2080	101964-262	•NUT, 6-32, HEX, STEEL			2
2085	B-3864-37	•WASHER, LOCK, INTERNAL TOOTH		2	Y
2090	4E2218-3	•SPACER, SUPERSEDED BY ITEM 2090A		2	
2090A	4H2218-3	•SPACER, SUPERSEDES ITEM 2090		2	
2095	4E2218-4	•SPACER, SUPERSEDED BY ITEM 2095A		1	
2095A	4H2218-4	•SPACER, SUPERSEDES ITEM 2095		1	

- ITEM NOT ILLUSTRATED

**Brush Block Assembly: 103158**



**105404 Assembly**



\*Tighten until snug.

**Brush Block Assembly: 105404**  
**Figure: App-11**



**HARTZELL ICE PROTECTION SYSTEM  
MANUAL 180**

FIG./ITEM NUMBER	PART NUMBER	DESCRIPTION	EFF CODE	UPA	O/H
<b>APP-11</b>	<b>105404</b>	<b>BRUSH BLOCK ASSEMBLY</b>			
2020	3H2011-1	•BRUSH MODULE ASSEMBLY "A"		1	
2030	3H2011-2	•BRUSH MODULE ASSEMBLY "B"		1	
2100	2H1260	••BUSHING, INSULATING			1
2040	3H2011-3	•BRUSH MODULE ASSEMBLY "C"		1	
2070	B-3871-S34	•SCREW, 6-32, 100 DEG HEAD		2	
2075	B-3837-N632	•WASHER, CORROSION RESISTANT		2	Y
2080	101964-262	•NUT, 6-32, HEX, STEEL			2
2085	B-3864-37	•WASHER, LOCK, INTERNAL TOOTH		2	Y
2095	4H2218-4	•SPACER		1	
2100	2H1260	•BUSHING, INSULATING		2	

- ITEM NOT ILLUSTRATED

**Brush Block Assembly: 105404**

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