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**HARTZELL**

**MANUAL REVISION TRANSMITTAL**  
**Manual 340**  
**Propeller Owner's Manual and Logbook**  
**REVISION 2 dated July 2017**

Attached is a copy of Revision 2 to Hartzell Propeller Inc. Manual 340.

Page Control Chart for Revision 2:

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pages 5-1 thru 5-4  
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NOTE 1: When the manual revision has been inserted in the manual, record the information required on the Record of Revisions page in this manual.

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

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

Manual No. 340  
Revision 2  
July 2017

# Propeller Owner's Manual and Logbook

## WING-IN-GROUND-EFFECT CRAFT PROPELLERS

Compact Constant Speed, Non-counterweighted  
( )HM-( )Y( )-1( )

Compact Constant Speed and Feathering  
( )HM-( )Y( )-2( )

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REVISION HIGHLIGHTS

Revision 2, dated July 2017 incorporates the following:

**COVER**

- Revised to match the manual revision

**REVISION HIGHLIGHTS**

- Revised to match the manual revision

**SERVICE DOCUMENT LIST**

- Revised to match the manual revision

**LIST OF EFFECTIVE PAGES**

- Revised to match the manual revision

**TABLE OF CONTENTS**

- Revised to match the manual revision

**DESCRIPTION AND OPERATION**

- Revised Table 2-2, "Composite Blade Model Identification"

**TESTING AND TROUBLESHOOTING**

- Added a NOTE about documents available on the Hartzell Propeller Inc. website, where applicable

**INSPECTION AND CHECK**

- Revised the section, "Blades"
- Removed the section, "Tachometer Inspection"
- Added a NOTE about documents available on the Hartzell Propeller Inc. website, where applicable
- Made other language/format changes

**MAINTENANCE PRACTICES**

- Added a NOTE about documents available on the Hartzell Propeller Inc. website, where applicable
- Revised the section, "Painting of Composite Blades"
- Revised Table 6-3, "Erosion Tape"
- Incorporated HM-SL-003 that added the section, "Tachometer Calibration"
- Made other language/format changes

**ANTI-ICE AND DE-ICE SYSTEMS**

- Revised the section, "De-ice System Operational Checks"
- Revised the section, "Anti-ice System Operational/Functional Checks"
- Made other language/format changes

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

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

**B. Components**

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

<u>Revision No.</u>	<u>Issue Date</u>	<u>Comments</u>
Original	Aug/13	New Issue
Rev. 1	Aug/14	Minor Revision
Rev. 2	Jul/17	Minor Revision



## SERVICE DOCUMENTS 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. USE OF OBSOLETE INFORMATION MAY CREATE AN UNSAFE CONDITION THAT MAY RESULT IN DEATH, SERIOUS BODILY INJURY, AND/OR SUBSTANTIAL PROPERTY DAMAGE. REFER TO THE APPLICABLE SERVICE DOCUMENT INDEX FOR THE MOST RECENT REVISION LEVEL OF THE SERVICE DOCUMENT.

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
HM-SL-003	Rev. 2, Jul/17



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Record of Temporary Revisions	9 and 10	Original	Aug/13
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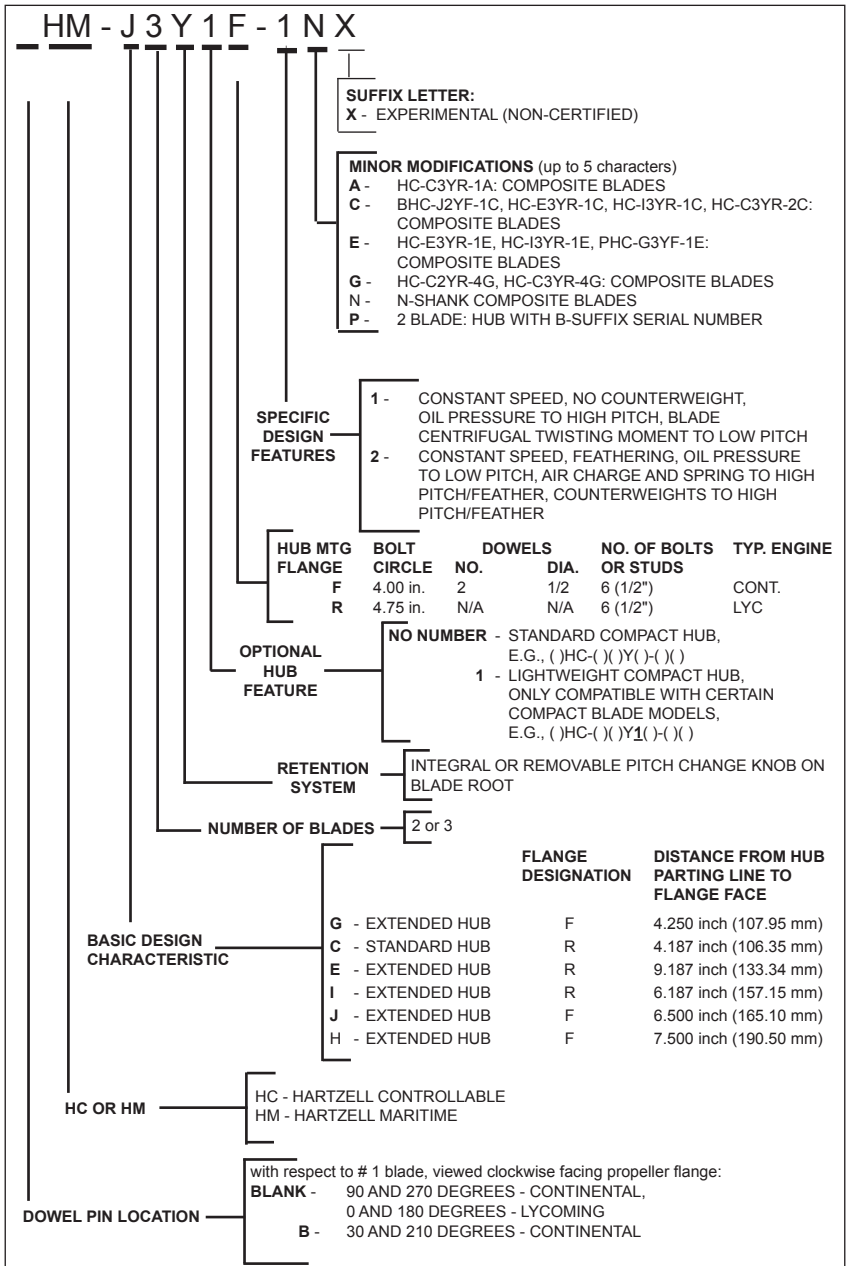
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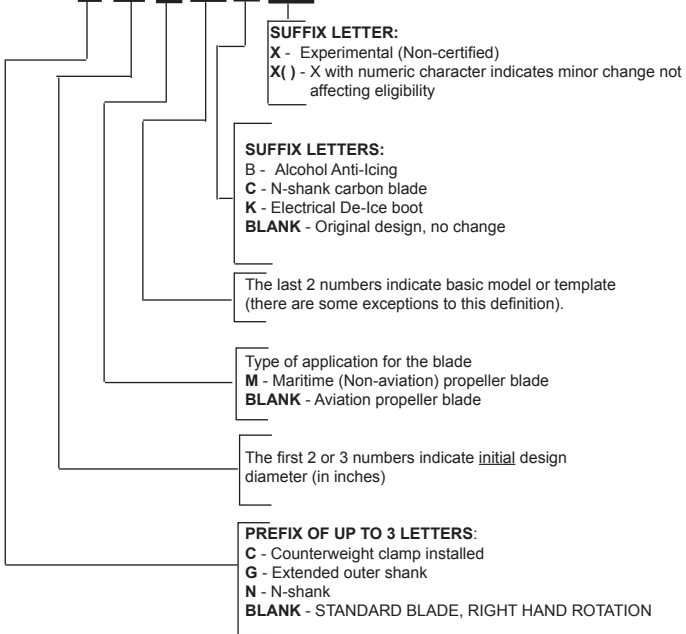
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**Propeller Model Identification  
Table 2-1**

prop model/**N 76 M 05 C X ( )**



BLADE TYPE	BLADE MODEL DESIGNATION
N-shank Carbon	N76M05C( )
	NC83M04-5( )

**Composite Blade Model Identification  
Table 2-2**

**1. Operational Tests**

Following propeller installation, and before every operation, the propeller system must be purged of air and proper operation verified.

**WARNING:** REFER TO THE CRAFT MAINTENANCE MANUAL FOR ADDITIONAL PROCEDURES THAT MAY BE REQUIRED AFTER PROPELLER INSTALLATION.

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

**A. Initial Run-Up**

- (1) Perform engine start and warm-up per the Pilot's Operating Handbook (POH).

**CAUTION:** AIR TRAPPED IN THE PROPELLER HYDRAULIC SYSTEM WILL CAUSE THE PITCH CONTROL TO BE IMPRECISE AND MAY RESULT IN PROPELLER SURGING.

- (2) Cycle the propeller control throughout its operating range from low to high (or as directed by the POH).
- (3) Repeat this procedure at least three times to purge air from the propeller hydraulic system and to introduce warmed oil to the cylinder.

**NOTE:** Pitch change response on the first operation from low to high blade pitch may be slow, but should speed up on the second and third cycles.

- (4) Verify proper operation from low pitch to high pitch and throughout operating range.
- (5) Shut down the engine in accordance with the POH.

**B. Static RPM Check**

**WARNING:** SAFELY SECURE THE CRAFT AND MAKE SURE OF THE SAFETY OF ANYONE NEAR THE CRAFT BEFORE PERFORMING STATIC RPM CHECK.

**CAUTION:** A CALIBRATED TACHOMETER MUST BE USED TO MAKE SURE OF THE ACCURACY OF THE RPM CHECK.

**NOTE 1:** This operational check should be performed after installation, maintenance, or propeller adjustment.

**NOTE 2:** Specific Hartzell Propeller Inc. manuals and service documents are available on the Hartzell website at [www.hartzellprop.com](http://www.hartzellprop.com). Refer to the Required Publications section in the Introduction chapter of this manual for the identification of these publications.

- (1) Secure the craft or tie the craft down to prevent movement.
- (2) Back the governor Maximum RPM Stop out one turn.
- (3) Start the engine.
- (4) Advance the propeller control lever to MAX (max RPM), then retard the control lever one inch (25.4 mm).
- (5) SLOWLY advance the throttle to maximum manifold pressure.
- (6) Slowly advance the propeller control lever until the engine speed stabilizes.
  - (a) If engine speed stabilizes at the maximum RPM specified by the Propeller Installation Data Sheet (IDS) listed in Hartzell Propeller Inc. Application Guide Manual 159, then the low pitch stop is set correctly.
  - (b) If engine speed stabilizes above or below the rated RPM, the low pitch stop may require adjustment. Refer to the Maintenance Practices chapter of this manual.
- (7) Stop the engine.
- (8) Return the governor Maximum RPM Stop to the original position, or adjust the governor to the rated RPM with the Maximum RPM Stop screw.

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**1. Preoperational Checks**

Follow propeller preoperational inspection procedures as specified in the Pilot Operating Handbook (POH). In addition, perform the following inspections:

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

**A. Blades**

- (1) Visually inspect the entire blade for nicks, gouges, erosion, and cracks. Refer to the Maintenance Practices chapter of this manual, for blade repair information.
- (2) Visually inspect the blades for lightning strike. Refer to the Lightning Strike section in this chapter for a description of damage.

**CAUTION 1:** FAILURE TO INSTALL THE EROSION TAPE CM158 ON AN N76M05C-( ) , OR NC83M04-5( ) BLADE THAT DOES NOT HAVE A DE-ICE/ANTI-ICING BOOT INSTALLED WILL CAUSE THE INBOARD LEADING EDGE OF THE BLADE TO ERODE PREMATURELY.

**CAUTION 2:** DO NOT INSTALL EROSION TAPE CM158 ON AN N76M05CB-( ) BLADE. THE N76M05CB-( ) BLADES USE AN ALCOHOL ANTI-ICE BOOT. INSTALLATION OF EROSION TAPE CM158 WILL PREVENT PROPER FUNCTION OF THE ANTI-ICE BOOT.

- (3) An N76M05C-( ) or NC83M04-5( ) blade that will not have a de-ice/anti-icing boot installed must have erosion tape CM158 installed on the leading edge. Refer to the Maintenance Practices chapter of this manual, for erosion tape installation instructions.

- B. Inspect the spinner and visible blade retention components for damage or cracks. Repair or replace components as required before further operation.
- C. Check for loose or missing hardware. Retighten or reinstall as necessary.

**WARNING:** ABNORMAL GREASE LEAKAGE CAN BE AN INDICATION OF A FAILING PROPELLER BLADE OR BLADE RETENTION COMPONENT. A BLADE SEPARATION CAN RESULT IN A CATASTROPHIC CRAFT ACCIDENT.

- D. Inspect for grease and oil leakage and determine its source.

**WARNING:** ABNORMAL VIBRATION CAN BE AN INDICATION OF A FAILING PROPELLER BLADE OR BLADE RETENTION COMPONENT. A BLADE SEPARATION CAN RESULT IN A CATASTROPHIC CRAFT ACCIDENT.

- E. Check the blades for radial play or movement of the blade tip (in and out, fore and aft, and end play). Refer to Loose Blades, in the Periodic Inspections section of this chapter, for blade play limits.
- F. Inspect the anti-icing or de-ice boots (if installed) for damage. Refer to the Anti-ice and De-ice Systems chapter of this manual, for inspection information.
- G. Refer to the Periodic Inspections section in this chapter for additional inspection information and possible corrections to any discrepancies discovered as a result of preoperational checks.



**C. Vibration**

Instances of abnormal vibration should be investigated immediately. If the cause of the vibration is not readily apparent, the propeller may be inspected by following the procedure below:

**NOTE:** It may be difficult to readily identify the cause of abnormal vibration. It may originate in the engine, propeller, or craft. Troubleshooting procedures typically initiate with investigation of the engine. Craft components (such as engine mounts or loose landing gear doors) can also be the source of vibration. When investigating an abnormal vibration, the possibility of a failing blade or blade retention component should be considered as a potential source of the problem.

- (1) Perform troubleshooting and evaluation of possible sources of vibration in accordance with engine or craft manufacturer's instructions.
- (2) Refer to the Vibration section in the Testing and Troubleshooting chapter of this manual. Perform the checks to determine possible cause of the vibration. If no cause is found, then consider that the origin of the problem could be the propeller and proceed with steps 4.C.(3) through 4.C.(8) in this chapter.
- (3) Remove the spinner dome.
- (4) Perform a visual inspection for cracks in the hub.
  - (a) Pay particular attention to the blade retention areas of the hub.
  - (b) A crack may be readily visible, or may be indicated by grease leaking from a seemingly solid surface.
- (5) If cracks are suspected, additional inspections must be performed before further operation. These inspections must be performed by qualified personnel at an appropriately certified propeller repair station to verify the condition. Such inspections typically include disassembly of the propeller, followed by inspection of parts, using nondestructive methods in accordance with published procedures.

- (6) Check the blades and compare blade to blade differences:
  - (a) Inspect the propeller blades for unusual looseness or movement. Refer to the Loose Blade section of this chapter.
  - (b) Check blade track. Refer to the Blade Track section of this chapter.

**CAUTION:** DO NOT USE BLADE PADDLES TO  
TURN THE BLADES.

- (c) Manually (by hand) attempt to turn the blades (change pitch).
  - (d) Visually check for damaged blades (delaminations, debonds, cracks, etc.).
- (7) If abnormal blade conditions or damage are found, additional inspections must be performed by an appropriately certified propeller repair station to evaluate the condition. Refer to the Composite Blade section in the Maintenance Practices chapter of this manual.
- (8) If cracks or failing components are found, parts must be replaced before further operation. Report such incidents to applicable authorities and to Hartzell Propeller Inc. Product Support.

### D. Blade Track

(1) Check blade track as follows:

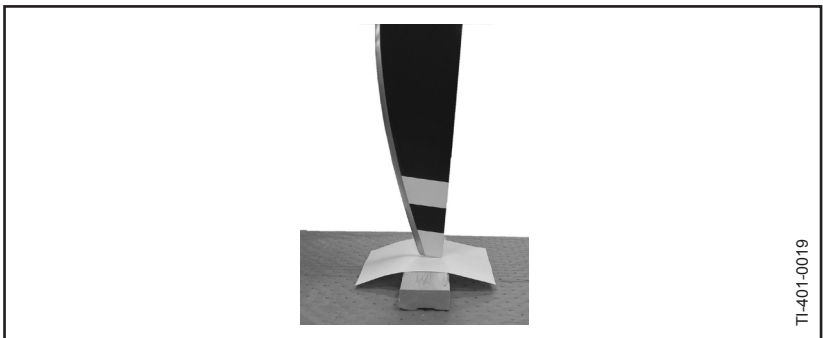
**WARNING:** SAFELY SECURE THE CRAFT AND MAKE SURE OF THE SAFETY OF ANYONE NEAR THE CRAFT BEFORE PERFORMING A CHECK FOR BLADE TRACK.

- (a) Secure the craft or tie the craft down to prevent movement.
- (b) Refer to Figure 5-1. Place a fixed reference point beneath the propeller, within 0.25 inch (6.3 mm) of the lowest point of the propeller arc.

**NOTE:** This reference point may be a flat board with a sheet of paper attached to it. The board may then be blocked up to within 0.25 inch (6.3 mm) of the propeller arc.

**WARNING:** MAKE SURE THAT THE ENGINE MAGNETO IS GROUNDED (OFF) BEFORE ROTATING THE PROPELLER.

- (c) Rotate the propeller by hand (opposite the direction of normal rotation) until a blade points directly at the paper. Mark the position of the blade tip in relation to the paper.
- (d) Repeat this procedure with the remaining blades.
- (e) Tracking tolerance is  $\pm 0.125$  inch ( $\pm 3.18$  mm) or 0.250 inch (6.35 mm) total.



**Checking Blade Track  
Figure 5-1**

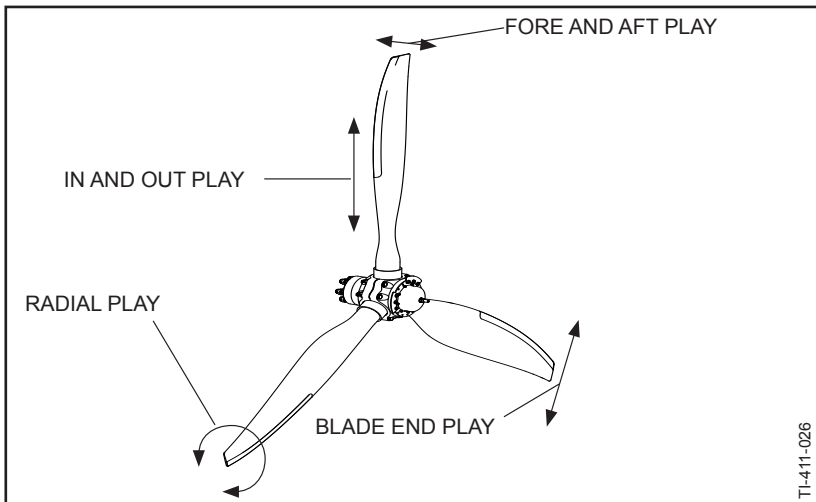
- (2) Possible Correction
  - (a) Remove foreign matter from the propeller mounting flange.
  - (b) If no foreign matter is present, refer to an appropriately certified propeller repair station.

### E. Loose Blades

Refer to Figure 5-2. Limits for blade looseness are as follows:

End Play (leading edge to trailing edge)	See Note below
Fore & Aft Movement (Face to camber)	See Note below
In & Out	None
Radial Play (pitch change)	$\pm 0.5$ degree (1 degree total) measured at reference station

**NOTE:** Blades are intended to be tight in the propeller, however slight movement is acceptable if the blade returns to its original position when released. Blades with excessive movement, or blades that do not return to their original position when released may indicate internal wear or damage that should be referred to an appropriately certified propeller repair station.



**Blade Play  
Figure 5-2**

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**F. Corrosion**

**WARNING:** REWORK THAT INVOLVES COLD WORKING THE METAL, RESULTING IN CONCEALMENT OF A DAMAGED AREA, IS NOT PERMITTED.

- (1) Light corrosion on the counterweights may be removed by qualified personnel in accordance with the Blade Repairs section in the Maintenance Practices chapter of this manual.
- (2) Heavy corrosion that results in severe pitting must be referred to a certified propeller repair station with the appropriate rating.

**G. Spinner Damage**

**NOTE:** Specific Hartzell Propeller Inc. manuals and service documents are available on the Hartzell website at [www.hartzellprop.com](http://www.hartzellprop.com). Refer to the Required Publications section in the Introduction chapter of this manual for the identification of these publications.

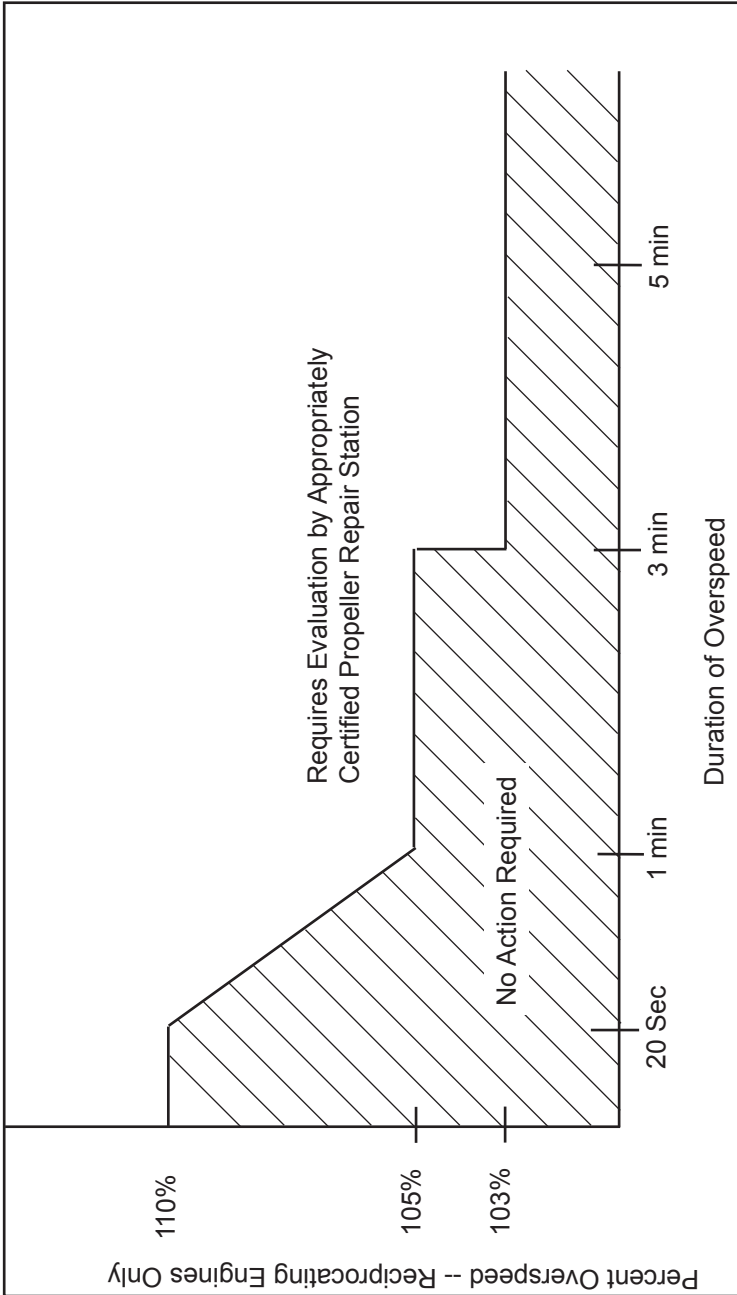
- (1) Inspect the spinner for cracks, missing hardware, or other damage.
- (2) For spinner damage acceptance and repair information, refer to Hartzell Propeller Inc. Manual 127 (61-16-27) or a certified propeller repair station with the appropriate rating.
- (3) Contact the local applicable authority for repair approval.

**H. Electric De-ice System**

- (1) Refer to the Anti-ice and De-ice Systems chapter of this manual for inspection procedures.

**I. Anti-ice System**

- (1) Refer to the Anti-ice and De-ice Systems chapter of this manual for inspection procedures.



**Reciprocating Engine Overspeed Limits**  
Figure 5-3

**5. Special Inspections**

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

**NOTE:** Specific Hartzell Propeller Inc. manuals and service documents are available on the Hartzell website at [www.hartzellprop.com](http://www.hartzellprop.com). Refer to the Required Publications section in the Introduction chapter of this manual for the identification of these publications.

**A. Overspeed**

An overspeed occurs when the propeller RPM exceeds the maximum RPM stated in the Propeller Installation Data Sheet (IDS) listed in Hartzell Propeller Inc. Application Guide Manual 159. The duration of time at overspeed for a single event determines the corrective action that must be taken to make sure no damage to the propeller has occurred.

The criteria for determining the required action after an overspeed are based on many factors. The additional centrifugal forces that occur during overspeed are not the only concern. Some applications have sharp increases in vibratory stresses at RPMs above the maximum rated for the craft/engine/propeller combination.

- (1) When a propeller installed on a reciprocating engine has an overspeed event, refer to the Reciprocating Engine Overspeed Limits in Figure 5-3 to determine the appropriate corrective action.
- (2) Make an entry in the propeller logbook about the overspeed event.

B. Lightning Strike - Composite Blades

**CAUTION 1:** ANY COMPOSITE BLADE SUSPECTED OF LIGHTNING STRIKE MUST BE INSPECTED AND MAY REQUIRE OVERHAUL.

**CAUTION 2:** CONSULT ENGINE AND CRAFT MANUFACTURER'S MANUALS. THERE MAY BE ADDITIONAL REQUIREMENTS SUCH AS DE-ICE AND ENGINE SYSTEM CHECKS TO PERFORM AFTER A PROPELLER LIGHTNING STRIKE.

**NOTE:** Lightning usually enters the propeller through the metal erosion shield of a blade. The charge typically enters at the tip of the blade and travels through the erosion shield toward the hub. The charge exits the erosion shield at the inboard end and enters the next conductive element in the path.

(1) Visual Inspection

- (a) If a lightning strike is suspected, perform a thorough visual inspection, looking for the indications of a lightning strike.

Brown stain on the erosion shield from lightning strike.



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**Evidence of Lightning Strike Damage to Composite Blade  
Figure 5-4**



**E. Fire Damage or Heat Damage**

**WARNING: EXPOSING COMPOSITE BLADES AND ALUMINUM HUBS TO HIGH TEMPERATURES MAY LEAD TO FAILURE THAT CAN CAUSE PERSONAL INJURY AND DEATH. ALUMINUM HUBS ARE MANUFACTURED FROM HEAT TREATED FORGINGS THAT ARE NOT TO BE ANNEALED AND RE-HEAT TREATED. EXPOSURE TO HIGH TEMPERATURES CAN ALSO DESTROY THE FATIGUE LIFE BENEFITS OBTAINED FROM SHOT PEENING. COMPOSITE BLADES ARE SUBJECT TO DELAMINATIONS BECAUSE OF HIGH TEMPERATURES.**

- (1) On rare occasions propellers may be exposed to fire or heat damage, such as an engine or hangar fire. In the event of such an incident, an inspection by an appropriately certified propeller repair station is required before further operation.

**6. Long Term Storage**

**NOTE:** Specific Hartzell Propeller Inc. manuals and service documents are available on the Hartzell website at [www.hartzellprop.com](http://www.hartzellprop.com). Refer to the Required Publications section in the Introduction chapter of this manual for the identification of these publications.

- A. Parts shipped from the Hartzell Propeller Inc. factory are not shipped or packaged in a container that is designed for long term storage.
- B. Long term storage procedures may be obtained by contacting a Hartzell Propeller Inc. distributor, or the Hartzell Propeller Inc. factory via the Product Support number listed in the Introduction chapter of this manual. Storage information is also detailed in Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).
- C. Information regarding the return of a propeller assembly to service after long term storage may be obtained by contacting a Hartzell Propeller Inc. distributor, or the Hartzell Propeller Inc. factory via the Product Support number listed in the Introduction chapter of this manual. This information is also detailed in Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02).

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**C. Damage Evaluation**

**NOTE:** Specific Hartzell Propeller Inc. manuals and service documents are available on the Hartzell website at [www.hartzellprop.com](http://www.hartzellprop.com). Refer to the Required Publications section in the Introduction chapter of this manual for the identification of these publications.

**(1) Operable Damage**

**CAUTION:** ALTHOUGH A BLADE MAY CONTINUE IN SERVICE WITH OPERABLE DAMAGE, THIS TYPE OF DAMAGE SHOULD BE REPAIRED AT THE EARLIEST PRACTICAL TIME.

(a) Operable damage is a specific condition to a blade that does not affect the safety or operational characteristics of the propeller blade and conforms to its type design by meeting the condition inspection criteria found in Hartzell Propeller Inc. Composite Propeller Blade Field Maintenance and Minor Repair Manual 170 (61-13-70).

- 1 The maximum limits of operable damage are specified in Hartzell Propeller Inc. Composite Propeller Blade Field Maintenance and Minor Repair Manual 170 (61-13-70).
- 2 Hartzell Propeller Inc. Composite Propeller Blade Field Maintenance and Minor Repair Manual 170 (61-13-70) provides inspection criteria and direction to evaluate damage to determine continued operation.
- 3 For ice protection system inspections, refer to the Anti-ice and De-ice Systems chapter of this manual.

(b) Although a blade may continue in service with operable damage, this type of damage should be repaired at the earliest practical time to prevent the damage from progressing to a condition that could require more extensive repair to the blade.

**(2) Inoperable Damage**

**CAUTION: IN MOST CASES, INOPERABLE DAMAGE MUST BE REPAIRED BEFORE THE NEXT OPERATION.**

(a) Inoperable damage is damage that exceeds the operable damage limits as specified in Hartzell Propeller Inc. Composite Propeller Blade Field Maintenance and Minor Repair Manual 170 (61-13-70).

- 1 Inoperable damage can affect the safety or operational characteristics of the propeller blade and does not conform to its type design.
- 2 This condition deems the blade inoperable, requiring appropriate corrective action to repair or remove it from service, as applicable.

**D. Repair Determination****(1) Minor Repair**

- (a) Minor repair is correction of damage that may be safely performed in the field by elementary operations.
- (b) For a complete description of minor repair and allowable procedures, refer to Hartzell Propeller Inc. Composite Propeller Blade Field Maintenance and Minor Repair Manual 170 (61-13-70).

**(2) Major Repair**

- (a) Major repair is correction of damage that cannot be performed by elementary operations.
- (b) Major repair work must be accepted by a certified mechanic with an appropriate rating, preferably one that holds a Factory Training Certificate from Hartzell Propeller Inc.
- (c) All Major repairs must be performed by a certified propeller repair station with the appropriate rating.

**E. Personnel Requirements**

- (1) Anyone performing or accepting responsibility for the inspection, repair and/or overhaul of a Hartzell Propeller Inc. product must comply with the applicable regulatory requirements established by the appropriate authority.
- (2) Any person signing for or performing inspections, repairs and/or overhauls to Hartzell Propeller Inc. composite parts should be familiar with the objectives and procedures associated with the inspection, repair and/or overhaul of composite parts.
- (3) Personnel requirements for the repair of Hartzell Propeller Inc. composite blades are specified in Hartzell Propeller Inc. Composite Propeller Blade Field Maintenance and Minor Repair Manual 170 (61-13-70).

**F. Blade Inspection Requirements**

**CAUTION:** MAINTAINING A GOOD LOGBOOK RECORD IS PARTICULARLY IMPORTANT FOR COMPOSITE PROPELLER BLADES. DAMAGE AND/OR REPAIRS MAY SUFFER FURTHER DEGRADATION AFTER CONTINUED USE. SUCH DEGRADATION MAY BE EASILY OVERLOOKED. IT IS IMPORTANT FOR INSPECTORS TO HAVE ACCESS TO ACCURATE HISTORICAL DATA WHEN PERFORMING SUBSEQUENT INSPECTIONS.

**NOTE:** Specific Hartzell Propeller Inc. manuals and service documents are available on the Hartzell website at [www.hartzellprop.com](http://www.hartzellprop.com). Refer to the Required Publications section in the Introduction chapter of this manual for the identification of these publications.

- (1) Required Record-Keeping
  - (a) Composite blade damage and a description of the repair must be recorded in the composite blade logbook.
- (2) Preoperational Inspection
  - (a) Follow propeller preoperational inspection procedures as specified in the craft maintenance manual, or craft operational specifications, or this manual. In addition, perform the following inspections:
    - 1 Visually inspect each entire blade for nicks, gouges, loose material, erosion, cracks and debonds.
    - 2 Visually inspect blades for lightning strike. Refer to the section, "Lightning Strike" in the Inspection and Check chapter of this manual for a description of damage.
  - (b) Defects or damage discovered during preoperational inspection must be evaluated in accordance with Hartzell Propeller Inc. Composite Propeller Blade Field Maintenance and Minor Repair Manual 170 (61-13-70).



**5. Painting of Composite Blades****A. General**

- (1) Propeller blades are painted with a durable specialized coating that is resistant to abrasion. If this coating becomes eroded, it is necessary to repaint the blades to provide proper corrosion and erosion protection. Painting should be performed in accordance with Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02) by a certified propeller repair station with the appropriate rating.
- (2) It is permitted to perform a blade touch-up with aerosol paint in accordance with section 5.B., "Procedure" in this chapter.
- (3) Refer to Table 6-2 for paints that are approved for blade touch-up.
- (4) The paint manufacturers may be contacted using the following information:

**Tempo Products Co.**

A Plasti-Kote Company  
1000 Lake Road  
Medina, OH 44256  
Tel: 800.321.6300  
Fax: 216.349.4241  
Cage Code: 07708

**Sherwin Williams Co.**

Refer to the Sherwin-Williams  
Product Finishes Global Finishes  
Group website at  
<http://oem.sherwin-williams.com>  
to find the nearest location.

**B. Procedure**

**WARNING:** CLEANING AGENTS (ACETONE, #700 LACQUER THINNER, AND MEK), ARE FLAMMABLE AND TOXIC TO THE SKIN, EYES AND RESPIRATORY TRACT. SKIN AND EYE PROTECTION IS REQUIRED. AVOID PROLONGED CONTACT. USE IN WELL VENTILATED AREA.

**CAUTION:** ANY REFINISHING PROCEDURE CAN ALTER PROPELLER BALANCE. PROPELLERS THAT ARE OUT OF BALANCE MAY EXPERIENCE EXCESSIVE VIBRATIONS WHILE IN OPERATION.

- (1) Using a clean cloth moistened with acetone, #700 lacquer thinner, or MEK, wipe the surface of the blade to remove any contaminants. Permit the solvent to evaporate.
- (2) Using 120 to 180 grit sandpaper, sand to feather the existing coatings away from the eroded or repaired area.
  - (a) Erosion damage is typically very similar on all blades in a propeller assembly. If one blade has more extensive damage, e.g. in the tip area, sand all the blades in the tip area to replicate the repair of the most severely damaged blade tip. This practice is essential in maintaining balance after refinishing.
- (3) Using lacquer thinner 700 or MEK, wipe the surface of the blade, and permit to evaporate.
- (4) Apply masking material to the erosion shield, anti-icing or de-ice boot and tip stripes, as needed.

**8. Propeller Low Pitch Setting**

**WARNING 1:** RPM ADJUSTMENTS MUST BE MADE WITH REFERENCE TO A CALIBRATED TACHOMETER. CRAFT MECHANICAL TACHOMETERS DEVELOP ERRORS OVER TIME, AND SHOULD BE PERIODICALLY RECALIBRATED TO MAKE SURE THE PROPER RPM IS DISPLAYED.

**WARNING 2:** LOW PITCH BLADE ANGLE ADJUSTMENTS MUST BE MADE IN ACCORDANCE WITH THE APPLICABLE TYPE CERTIFICATE OR SUPPLEMENTAL TYPE CERTIFICATE HOLDER'S MAINTENANCE DATA.

**NOTE:** Specific Hartzell Propeller Inc. manuals and service documents are available on the Hartzell website at [www.hartzellprop.com](http://www.hartzellprop.com). Refer to the Required Publications section in the Introduction chapter of this manual for the identification of these publications.

**A. Low Pitch Stop - All Propeller Models**

- (1) The propeller low pitch stop is set at the factory and should not require any additional adjustment. The required low pitch stop blade angle is listed in the Propeller Installation Data Sheet (IDS) listed in Hartzell Propeller Inc. Manual 159 and may also provide the acceptable RPM range for a maximum power static condition. Be aware that the static RPM may be specified to be less than the RPM to which the engine is rated.
- (2) An overspeed at the maximum power static condition may indicate that the propeller low-pitch blade angle is set too low and that the governor is improperly adjusted.
- (3) An underspeed during the maximum power static condition may be caused by any one or a combination of the following: The propeller low pitch blade angle is too high; the governor is improperly adjusted; the engine is not producing rated power.

**B. Max. RPM (Static) Low Pitch Stop Adjustment**

**WARNING:** SIGNIFICANT ADJUSTMENT OF THE LOW PITCH STOP TO ACHIEVE THE SPECIFIED STATIC RPM MAY MASK AN ENGINE POWER PROBLEM.

Refer to the following applicable procedure for accomplishing an adjustment to the low pitch angle:

**(1) Non-Feathering (-1) Low Pitch Stop Adjustment**

(a) Refer to Figure 6-7. Loosen the jam nut while holding the low pitch stop with an allen wrench to prevent the low pitch stop from turning as the jam nut is loosened. Turning the low pitch stop in will increase blade pitch to reduce RPM, and turning the low pitch stop out will lower blade pitch and increase RPM. The low pitch stop has 24 threads per inch.

- 1** Turning the stop 3/4 of a turn (0.030 inch [0.76 mm] of linear travel) will change the blade pitch by approximately one degree. One degree of blade pitch will change engine RPM by approximately 140-150 RPM.
- 2** Turning the low pitch stop screw one revolution equals 0.042 inch (1.06 mm) of linear travel, and results in approximately 1.4 degree blade angle change. This blade angle change results in an RPM increase/decrease of approximately 200 RPM.

**WARNING:** A MINIMUM OF FIVE THREADS IN THE CYLINDER MUST ENGAGE THE LOW PITCH STOP AFTER ADJUSTMENT IS COMPLETED.

- (b) When the low pitch stop is adjusted, torque the low pitch stop jam nut in accordance with Torque Table 3-2.
- (c) Repeat the Static RPM Check in the Testing and Troubleshooting chapter of this manual.

**12. Installation of Erosion Tape CM158**

**NOTE:** Specific Hartzell Propeller Inc. manuals and service documents are available on the Hartzell website at [www.hartzellprop.com](http://www.hartzellprop.com). Refer to the Required Publications section in the Introduction chapter of this manual for the identification of these publications.

**A. General**

- (1) This section provides the procedures for the installation of erosion tape CM158 on a blade that will not have an anti-icing or de-ice boot installed.
  - (a) For the installation of erosion tape CM158 on a blade that has a de-ice boot installed, refer to Hartzell Propeller Inc. Electrical De-ice Boot Removal and Installation Manual 182 (61-12-82).
  - (b) For the installation of erosion tape CM158 on a blade that has an anti-icing boot installed, refer to Hartzell Propeller Inc. Anti-icing Boot Removal and Installation Manual 183 (61-12-83).
- (2) Application of erosion tape CM158 is required for the blade models listed in Table 6-3.
- (3) Application of erosion tape CM158 is optional but highly recommended for all other models of composite blades.
- (4) A minimum temperature of 60°F (10°C) is required for erosion tape CM158 application.
- (5) Keep hands clean at all times.
- (6) Paint must cure for a minimum of 8 hours before installing erosion tape CM158.

<b>Blade Model</b>	<b>Tape Length (per Blade)</b>
N76M05C-( ) that does not have a de-ice or anti-icing boot installed	14.875 inches (377.82 mm)
NC83M04-5( ) that does not have a de-ice or anti-icing boot installed	13.125 inches (333.37 mm)

**Erosion Tape  
Table 6-3**

**B. Materials Required****(1) Consumables**

**NOTE:** For additional information about CM numbers or materials refer to the Consumable Materials chapter of Hartzell Propeller Inc. Standard Practices Manual 202A (61-01-02) or contact the Hartzell Propeller Inc. Propeller Inc. Product Support Department.

- (a) Erosion Tape CM158, Hartzell Propeller Inc. part number A-6741-168
- (b) Methyl-Ethyl-Keytone (MEK) CM106, Methyl Propyl Ketone (MPK) CM219, or Acetone CM173
- (c) Cheesecloth, Grade 90 CM159, locally procured
- (d) Masking Tape, locally procured
- (e) 3M Adhesive Promoter 86A, CM124, optional

**(2) Tools**

**NOTE:** For additional information about TE numbers or materials in this manual refer to the Hartzell Propeller Inc. Illustrated Tool and Equipment Manual 165 (61-00-65) or contact the Hartzell Propeller Inc. Product Support Department.

- (a) Ball Point Pen or Pencil, locally procured
- (b) Measuring Tape, locally procured
- (c) Rubber Roller TE330 or Silicon Roller TE331

- (e) Using a roller, such as TE330 or TE331, or fingers, work the erosion tape CM158 into position on one side of the blade.
- 1 Starting at the outboard end of the blade and working toward the shank, use a hard rubber or nylon roller, such as TE330 or TE331, or fingers to firmly seat the erosion tape CM158 to the blade.
  - 2 Make sure that there are no wrinkles and that no air is trapped under the erosion tape CM158.
- CAUTION: DO NOT DAMAGE THE BLADE WHEN REMOVING AIR BUBBLES.**
- 3 Remove air bubbles under the erosion tape by carefully puncturing the erosion tape CM158 with a sharp pin and pressing out the trapped air.
- (f) Repeat the procedure on the other side of the blade.

### 13. Tachometer Calibration

**WARNING: OPERATION WITH AN INACCURATE TACHOMETER CAN CAUSE RESTRICTED RPM OPERATION AND DAMAGING HIGH STRESSES. PROPELLER LIFE WILL BE SHORTENED AND COULD CAUSE CATASTROPHIC FAILURE.**

- A. All engine/propeller combinations have operating conditions at which the propeller blade stresses begin to reach design limits.
- (1) In most cases, these conditions occur above the maximum rated RPM of the engine.
  - (2) Some engine/propeller combinations have certain ranges of RPM that are less than maximum engine speed, where stresses are at a level considered too high for continuous operation. This results in a restricted operating range where continuous operation is not permitted. A placard on the instrument panel or yellow arc on the tachometer will inform the pilot to avoid operation in this range.

- (3) In other cases, the limiting condition occurs at an RPM only slightly above the maximum engine RPM.
  - (4) For these reasons, it is very important to accurately monitor engine speed.
- B. The accuracy of the tachometer is critical to the safe operation of the craft.
- (1) Some tachometers have been found to be in error by as much as 200 RPM.
  - (2) Operating the craft with an inaccurate tachometer could cause continued operation at unacceptably high stresses, including repeatedly exceeding the maximum engine RPM.
  - (3) Continuous operation in a restricted RPM range subjects the propeller to stresses that are higher than the design limits.
  - (4) Stresses that are higher than the design limits will shorten the life of the propeller and could cause a catastrophic failure.
- C. Tachometer Calibration
- (1) Hartzell Propeller Inc. recommends that propeller owners/operators calibrate the engine tachometer in accordance with the National Institute of Standards and Technology (NIST) or similar national standard (traceable).
  - (2) Contact Hartzell Propeller Inc. if it is determined that a propeller was operated in a restricted RPM range because of a tachometer error.



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**B. Anti-ice System**

- (1) The anti-ice system is controlled by the pilot via a cockpit mounted rheostat. This rheostat operates a pump that pumps anti-ice fluid from the tank at a controlled rate.
- (2) 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. 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 which are welded to the slinger ring, and then out onto the blade anti-icing boots.
- (3) The blade anti-icing boots are ridged rubber sheets that are glued to the leading edge of the blades. The ridges in the anti-icing boots direct the fluid out onto the blades and permit for an even distribution of the anti-ice fluid across the blades.

**3. De-ice System Operational Checks**

- A. Operational checks of the de-ice system should be performed in accordance with the following Hartzell Propeller Inc. Manuals, that are available on the Hartzell Propeller Inc. website at [www.hartzellprop.com](http://www.hartzellprop.com):
- (1) Hartzell Propeller Inc. Manual No. 181 (30-60-81) - Propeller Ice Protection System Component Maintenance Manual
  - (2) Hartzell Propeller Inc. Manual No. 182 (61-12-82) - Propeller Electrical De-ice Boot Removal and Installation Manual
- B. Components supplied by Hartzell Propeller Inc. for use in de-ice systems are found in the following manuals that are available on the Hartzell Propeller Inc. website at [www.hartzellprop.com](http://www.hartzellprop.com):
- (1) Hartzell Propeller Inc. Manual 180 (30-61-80) - Propeller Ice Protection System Manual
  - (2) Hartzell Propeller Inc. Manual 182 (61-12-82) - Propeller Electrical De-ice Boot Removal and Installation Manual

**4. Anti-ice System Operational/Functional Checks**

- A. Operational/functional checks of the anti-ice system should be performed in accordance with the Aircraft Maintenance Manual and the following Hartzell Propeller Inc. manual that is available on the Hartzell Propeller Inc. website at [www.hartzellprop.com](http://www.hartzellprop.com):
- (1) Hartzell Propeller Inc. Manual 181 (30-60-81) - Propeller Ice Protection System Component Maintenance Manual
- B. Components supplied by Hartzell Propeller Inc. for use in anti-ice systems are found in the following manuals that are available on the Hartzell Propeller Inc. website at [www.hartzellprop.com](http://www.hartzellprop.com):
- (1) Hartzell Propeller Inc. Manual 180 (30-61-80) - Propeller Ice Protection System Manual
  - (2) Hartzell Propeller Inc. Manual 183 (61-12-83) - Propeller Anti-icing Boot Removal and Installation Manual

**5. De-ice and Anti-ice System Inspections**

The inspections detailed below are made on a regular basis, either before operation, during the 100 hour inspection, or if a problem is noted. Possible corrections to problems discovered during inspections, additional inspections, and limits are detailed in the following Hartzell Propeller Inc. manuals.

**A. De-ice System Inspections**

- (1) Perform inspections in accordance with the following Hartzell Propeller Inc. Manuals, that are available on the Hartzell Propeller Inc. website at [www.hartzellprop.com](http://www.hartzellprop.com):
  - (a) Hartzell Propeller Inc. Manual 181 (30-60-81)  
- Propeller Ice Protection System Component Maintenance Manual
  - (b) Hartzell Propeller Inc. Manual 182 (61-12-82)  
- Propeller Electrical De-ice Boot Removal and Installation Manual

**B. Anti-ice System Inspections**

- (1) Perform inspections in accordance with the following Hartzell Propeller Inc. Manuals, that are available on the Hartzell Propeller Inc. website at [www.hartzellprop.com](http://www.hartzellprop.com):
  - (a) Hartzell Propeller Inc. Manual 181 (30-60-81)  
- Propeller Ice Protection System Component Maintenance Manual
  - (b) Hartzell Propeller Inc. Manual 183 (61-12-83) -  
Propeller Anti-icing Boot Removal and Installation Manual

**6. De-ice and Anti-ice System Troubleshooting****A. De-ice System Troubleshooting**

(1) Perform troubleshooting in accordance with the following Hartzell Propeller Inc. Manuals, that are available on the Hartzell Propeller Inc. website at [www.hartzellprop.com](http://www.hartzellprop.com):

(a) Hartzell Propeller Inc. Manual No. 181  
(30-60-81) - Propeller Ice Protection System  
Component Maintenance Manual

(b) Hartzell Propeller Inc. Manual No. 182  
(61-12-82) - Propeller Electrical De-ice Boot  
Removal and Installation Manual

**B. Anti-ice System Troubleshooting**

(1) Perform troubleshooting in accordance with the following Hartzell Propeller Inc. Manuals, that are available on the Hartzell Propeller Inc. website at [www.hartzellprop.com](http://www.hartzellprop.com):

(a) Hartzell Propeller Inc. Manual No. 181  
(30-60-81) - Propeller Ice Protection System  
Component Maintenance Manual

(b) Hartzell Propeller Inc. Manual No. 183 (61-12-83)  
- Propeller Anti-icing Boot Removal and Installation  
Manual