Cessna
A Textron Company

CONSTANT SPEED COMPOSITE OWNER/OPERATOR INFORMATION MANUAL

Member of GAMA

REVISION 1 9 JANUARY 2017

11 APRIL 2014

INTRODUCTION - LIST OF EFFECTIVE PAGES

INTRODUCTION - CONTENTS

LIST OF REVISIONS

1. General

A. This manual, MPC-27 Constant Speed Composite Owner/Operator Information Manual, includes the original issue and the revisions listed in Table 1. To ensure information in this manual is current and the latest maintenance and inspections procedures are available, the revisions must be incorporated in the manual as they are issued.

Table 1. Original Issue -- April 11, 2014

Revision Number	Date	Revision Number	Date
1	January 9, 2017		

B. FAA Approved Airworthiness Limitations are incorporated in this maintenance manual as Chapter 4. Revisions to Chapter 4 are dated as approved by the FAA Regional Manager, Aircraft Certification Office. To ensure that the maintenance information required under Parts 43.16 and 91.403 of Part 14 of the Code of Federal Regulations is current, the revisions listed in Table 2 must be incorporated in Chapter 4 as they are issued.

Table 2. Original Issue -- April 11, 2014

Revision Number	Date	Revision Number	Date

2. Export Compliance

A. This publication contains technical data and is subject to U.S. export regulations. This information has been exported from the United States in accordance with export administration regulations. Diversion contrary to U.S. law is prohibited.

ECCN: 9E991

INTRODUCTION

1. General

A. The instructions for continued airworthiness (ICA) in this publication uses the data available at the time of publication. This publication is updated, supplemented, and changed by service letters, service bulletins, publication revisions, reissues, ICA supplements, and temporary revisions, which are supplied by subscription services available from McCauley Product Support. All of these changes become part of and are specifically included in this publication which is the principal manual for ICA. The latest changes to this publication are given through the McCauley Product Support subscription services and/or McCauley authorized service facilities.

WARNING: The purchaser is warned not to use the data in McCauley's overhaul/maintenance/service/information manuals when parts are designed, manufactured, remanufactured, overhauled, and/or approved by entities, other than McCauley or McCauley authorized entities, are installed. When non-McCauley parts are used, the data in McCauley's overhaul/maintenance/service/information manuals is no longer applicable. All of the inspection intervals, replacement time limits, overhaul time limits, inspection methods, life limits, cycle limits, etc., McCauley recommends are given when new, remanufactured, or overhauled McCauley approved parts are installed. All inspection intervals, replacement time limits, overhaul time limits, the methods of inspection, life limits, cycle limits, etc., for non-McCauley parts must come from the manufacturer and/or seller of the non-McCauley parts.

B. Inspection, maintenance and parts requirements for Supplemental Type Certificate (STC) installations are not given in this manual. When the propeller has an STC installation, those parts of the propeller that the installation has an effect on, must be examined in accordance with the inspection program published by the owner of the STC. McCauley-supplied inspection criteria may not be valid for propellers that have STC installations because they may change the systems interface, operating characteristics and component loads or stresses on adjacent structures.

WARNING: Any inspection and/or repair requiring disassembly, reassembly or overhaul of a McCauley propeller must be done in an FAA-approved or international equivalent propeller repair station by qualified personnel.

C. Users of this manual are presumed to have sufficient training to follow these instructions carefully and correctly.

D. The inspection requirements are stated in a manner to establish what propeller component is to be inspected, preferred inspection method, and criteria for airworthiness.

2. How to Get Customer Assistance

A. REVISIONS, REISSUES and TEMPORARY REVISIONS can be purchased directly from Cessna:, Attention: Customer Care, E-mail: Customercare@cessna.textron.com, Telephone 316-517-5800, Telefax 316-517-7271.

B. Product Support

McCauley Product Support	
Mailing Address	McCauley Propeller Systems 5800 East Pawnee Wichita, KS 67218

(1) If you need assistance with a general support question, publication information, subscriptions, or maintenance programs visit our website at **www.mccauley.textron.com** or contact:

McCauley Product Support	
Phone Numbers	Wichita, Kansas
	1-800-621-7767 or 316-831-4021
Fax	316-206-9948
E-mail Address	**productsupport@mccauley.textron.com**

3. Coverage

A. The McCauley MPC27 Constant Speed Composite Owner/Operator Information Manual is prepared with information given by the ATA (Air Transport Association) Specification Number 2200 for Manufacturer's Technical Data.

B. The information in this Owner/Operator Information Manual is applicable to the following model propellers:

Table 1. Table 1: Propeller Models

Propeller Models					
D3A37C3401-X					

C. This manual gives the necessary information required to help maintenance personnel service, examine, troubleshoot, remove and install McCauley Propellers.

D. Information in this manual is applicable to all U.S. and Foreign Certified propellers.

4. Instructions for Continued Airworthiness (ICA)

A. Owner/Operator Information Manual

(1) The instructions provided in this manual are the principal instructions for continued airworthiness. This manual may be revised to add changes to the ICAs or to add additional ICAs when changes to an affected propeller type design require changes to these instructions. When a revision to this manual is not possible within the time constraints for these ICAs, the instructions may be transmitted with a temporary revision or with an ICA supplement. Temporary revisions will be incorporated in the next revision to this manual and ICA supplements will also be incorporated in the next revision unless these instructions require restricted distribution.

B. Temporary Revisions

(1) Temporary revisions may be produced to transmit supplemental instructions for continued airworthiness when a revision to the owner/operator information manual is not possible within the time constraints for these ICAs. They consist of complete page blocks which replace the existing paper and will temporally supersede the CD-ROM data. Temporary revisions will be included on the CD-ROM on the next CD-ROM release. Temporary revisions are numbered consecutively in the ATA chapter assignment. Page numbering uses the three-element number, which matches the owner/operator information manual.

(2) Paper Version of the owner/operator information

(a) Paper temporary revisions will be distributed on yellow paper. File the temporary revision cover sheet after the title page of the chapter to which it applies and substitute or add the remaining pages in the paper manual.

(3) Electronic (Cesview) Version of the Maintenance Manual.

(a) The cover sheet will be located in the maintenance manual Cesview library at the beginning of the chapter to which it applies and the changed or added pageblocks will be located in the appropriate location by ATA. All revised or added information will be highlighted blue.

C. ICA Supplements

(1) ICA supplements may be produced to transmit supplemental instructions for continued airworthiness when a revision to the owner/operator information manual is not possible within the time constraints for these ICAs. ICA supplements will provide supplemental instructions for one or more ICA manual and is to be used in conjunction with the affected manuals (maintenance manual, wiring diagram manual, etc.) until those instructions are incorporated into the manuals. ICA supplements are numbered consecutively by model in the ATA chapter assignment. Page numbering uses the three-element number, which matches the affected manuals.

(2) Refer to the ICA Supplement List to determine the incorporation status for each manual affected.

5. List of Obsoleted Documents

A. The following service information has been incorporated into this manual. This service information is now obsolete and replaced by this manual for the propellers affected by this manual.

Service Bulletin Number	Service Bulletin Date	Manual Incorporation

Service Letter Number	Service Letter Date	Manual Incorporation

6. List of Incorporated Documents

A. The following service information has been incorporated into this manual. Due to the relationship of the service information to active Airworthiness Directives, the service information also remains active.

Service Bulletin Number	Service Bulletin Date	Manual Incorporation	Airworthiness Directive Number

7. Applicable Service Bulletins and Service Letters

A. Alert Service Bulletin

(1) Alert Service Bulletins are technical documents that provide instructions and, if applicable, part information for the incorporation of an installation, modification, or repair to a specific propeller or propeller component. Alert Service Bulletins are used to announce mandatory special product inspection criteria and modifications, revised maintenance information and/or revised operational information which has been determined to be critical for the continued safe and reliable performance of the propeller, or propeller component.

B. Service Bulletin

(1) Service Bulletins are technical documents that provide instructions and, if applicable, part information for the incorporation of an installation, modification, or repair to a specific propeller or propeller component. Service Bulletins are used to announce special product inspection criteria

and modifications, revised maintenance information and/or revised operational information which has been determined to be critical for the continued safe and reliable performance of the propeller, or propeller component.

C. Service Letter
   (1) Service Letters are used to announce support and service information.

D. Special Service Project
   (1) Special Service Projects (SSP's) are similar to service bulletins and are used to announce special product inspection criteria and modifications, revised maintenance information and/or revised operational information which is intended to assist in improving propeller safety, reliability, durability and/or performance. SSP's typically contain similar information and/or headings as service bulletins, but are often tailored for special situations and/or conditions or logistical requirements that may affect only a limited number of propellers. One additional heading that can be found on a SSP is the heading titled "Duration". The Duration heading provides an expiration date for the SSP when used.

8. Cross Reference Listing of Popular Name Verses Model Numbers

A. All propellers are certified under model number designations. However, in this manual reference to specific propellers is almost always by the shortened propeller model number unless the full model number is necessary to differentiate between versions of the same basic model.

Example: the D3A37C3401-[X]/[X]-C80MNF-[X] propeller assembly is shortened to the Hub model designation D3A37C3401 which can also be shortened to C3401.

9. Using the Owner/Operator Information Manual

A. Division of Subject Matter.
   (1) This manual is divided into two chapters which are divided by section and subject. The manual divisions are as follows:

Chapter	Title
	Introduction
4	Airworthiness Limitations
61	Propeller

B. Page Numbering System.
   (1) All system/subsystem/unit (chapter/section/subject) maintenance data is separated into specific types of information: description and operation, troubleshooting, maintenance practices. Blocks of sequential page numbers are used to identify the type of information:

Page 1 through 99	Description and Operation
Page 101 through 199	Troubleshooting
Page 201 through 299	Maintenance Practices

   (2) Relatively simple units may not require description and operation, troubleshooting information. In such cases, these pages are omitted. When subtopics are brief, they may be combined into a topic entitled Maintenance Practices. Maintenance Practices is actually a combination of subtopics, including Servicing, Removal/Installation, Adjustment/Test, Cleaning/Painting or Approved Repairs.
   (3) Lengthy subtopics may be treated as an individual topic. Page numbering for the individual topics is as follows:

Page 301 through 399	Servicing
Page 401 through 499	Removal/Installation
Page 501 through 599	Adjustment/Test
Page 601 through 699	Inspection/Check
Page 701 through 799	Cleaning/Painting
Page 801 through 899	Approved Repairs

(4) Illustrations are tied into the page numbering system. For example, all illustrations within a 200 page numbering section will begin with the number 2 (i.e. Figure 201, Figure 202, etc.). All illustrations within a 300 page numbering section will begin with the number 3 (Figure 301, Figure 302, etc.).

10. Dimensions and Units

A. Dimensions and Units.
(1) All dimensions and units (except propeller blade station lines) are given in both English and metric (International System of Units [SI]) units in the text and the illustrations. The English value is given and then the metric unit is given in parenthesis.
(2) Metric units are given in standard abbreviations.
(3) Propeller blade station lines and locations are not given in metric units.

11. Temporary Revisions

A. Additional information which becomes available may be provided by temporary revision. This service is used to provide, without delay, new information which will assist in maintaining safety. Temporary revisions are numbered consecutively within the ATA chapter assignment. Temporary revisions are normally incorporated into the manual at the next regularly scheduled revision.

12. Material Presentation

A. This manual is available on paper and CD.

13. Service Bulletins

A. Service bulletins may require special inspections and authorize modifications to propellers. As service bulletins are issued, they will be incorporated in the next scheduled revision and noted in the Service Bulletin List, included in this Introduction. The list of service bulletins uses three columns to summarize information:
(1) Service Bulletin Number - This column identifies the bulletin by number.
(2) Service Bulletin Date - This column indicates the initial date the bulletin became active.
(3) Manual Incorporation - This column indicates the date the service bulletin has been incorporated in the manual.

14. List of Effective Pages

A. A list of effective pages is provided at the beginning of each chapter. All pages in the specific chapter are listed in numerical sequence on the Effectivity Page(s) with the date of issue for each page.

15. Revision Filing Instructions

A. Regular Revision
(1) Pages to be removed or inserted in the manual are determined by the effectivity page. Pages are listed by the three-element number (chapter/section/subject) and then by page number. When two pages display the same three-element number and page number, the page with the most recent Date of Page Issue shall be inserted in the manual. The date column on the corresponding chapter effectivity page shall verify the active page.

B. Temporary Revision

(1) File temporary revisions in the applicable chapter(s) in accordance with filing instructions appearing on the first page of the temporary revision.
(2) The rescission of a temporary revision is accomplished by incorporation into the manual or by a superseding temporary revision. A Record of Temporary Revisions is furnished in the Temporary Revision List located previous to the Introduction. A Manual Incorporation Date column on the Temporary Revision List page will indicate the date the Temporary Revision was incorporated, thus authorizing the rescission of the temporary revision.

16. Identifying Revised Material

A. Additions or revisions to text in an existing section will be identified by a revision bar in the left margin of the page and adjacent to the change.

B. Revised text inside tables, including Appendices, will not display revision bars; however, the affected page will display the current revision date in the Date of Page Issue location.

C. When extensive technical changes are made to text in an existing section that requires extensive revision, revision bars will appear the full length of text.

D. When art in an existing illustration is revised, a revision bar along the entire vertical length of one side of the illustration will be used to indicate changes to the illustration.

17. Warnings, Cautions and Notes

A. Throughout the text in this manual, warnings, cautions and notes pertaining to the procedures being accomplished are included. These adjuncts to the text are used to highlight or emphasize important points. Warnings and Cautions precede the text to which they apply, and Notes follow the text to which they apply.
(1) WARNING - Calls attention to use of materials, processes, methods, procedures or limits which must be followed precisely to avoid injury or death to persons.
(2) CAUTION - Calls attention to methods and procedures which must be followed to avoid damage to equipment.
(3) NOTE - Calls attention to methods which will make the job easier.

18. Log Book

A. The owner/operator is required to maintain a permanent log book for each serial numbered propeller assembly containing the following information:
(1) The total time (flight hours) in service of each propeller assembly including flight hours on each serial numbered hub and blade.
(2) The airplane on which the propeller has been installed. (Recorded by the airplane manufacturer, registration number (tail number), aircraft serial number, and model types.)
(3) The time in service (flight hours) and the calendar period (months, days, years) each propeller assembly (recorded by hub and blade serial numbers) was installed on an aircraft.
(4) Records of the maintenance, inspections, alterations and overhauls performed on each propeller assembly.
(a) The records must include:
1 A description of the work performed, including the disposition of the affected parts.
2 The date that the work was accomplished.
3 The signature and certification number of the person approving the propeller assembly for return to service.

19. Customer Comments on Manual

A. McCauley Propeller Systems has endeavored to furnish you with an accurate, useful, and up-to-date manual. This manual can be improved with your help. Please return the registration card to receive revisions to this manual. Please contact McCauley Product Support to report any errors, discrepancies, and omissions in this manual as well as any general comments you wish to make.

ICA SUPPLEMENT LIST

ICA Supplement Number	Title	ICA Supplement Date	Manual Incorporation Date

NOTE: No ICA Supplements have been issued that affect this manual.

CHAPTER

4

AIRWORTHINESS LIMITATIONS

THE AIRWORTHINESS LIMITATIONS SECTION IS FAA APPROVED AND GIVES INSPECTIONS AND MAINTENANCE THAT ARE REQUIRED BY PARTS 43.16 AND 91.403 OF TITLE 14 OF THE CODE OF FEDERAL REGULATIONS, UNLESS AN ALTERNATIVE PROGRAM HAS BEEN FAA APPROVED.

APPROVED BY Margaret Kline

Margaret Kline, Manager
Aircraft Certification Office
Federal Aviation Administration
Wichita, Kansas

DATE OF APPROVAL 11 April 2014

11 APRIL 2014

LIST OF EFFECTIVE PAGES

CHAPTER-SECTION-SUBJECT	PAGE	DATE
04-Title		
04-List of Effectivity Page		
04-Record of Temporary Revisions		
04-Contents		
4-00-00	Page 1	Apr 11/2014
4-10-00	Page 1	Apr 11/2014
4-11-00	Page 1	Apr 11/2014

APPROVED BY Margaret Kline

Margaret Kline, Manager
Aircraft Certification Office
Federal Aviation Administration
Wichita, Kansas

DATE OF APPROVAL 11 April 2014

CONTENTS

AIRWORTHINESS LIMITATIONS

1. Scope

A. This chapter outlines the mandatory replacement times and inspection intervals for propeller components considered to be life limited, or to require monitoring through scheduled inspections. This chapter applies to items such as fatigue components and structures that are considered a part of the certification process.

NOTE: The Airworthiness Limitations section is FAA Approved and specifies maintenance required by 14 CFR 43.16 and 91.403, unless an alternative program has been FAA approved.

2. Definition

A. This chapter contains two sections as outlined below.
(1) Inspection Time Limits (4-10-00) describes and lists components that are required to be inspected at specified intervals. The intervals specified represent the maximum time allowable between inspections.
(2) Replacement Time Limits (4-11-00) describes and lists life limited components that are to be replaced at a specific time.

INSPECTION TIME LIMITS

1. General

A. There are no inspection time limits for the C3400 Series propellers.

REPLACEMENT TIME LIMITS

1. General

A. There are no life limited components for the C3400 Series propellers

CHAPTER

61

PROPELLERS

61 - LIST OF EFFECTIVE PAGES

61 - CONTENTS

CONSTANT SPEED PROPELLER SYSTEM DESCRIPTION AND OPERATING PRINCIPLES

1. Reciprocating (Piston) Engine Propellers

A. The McCauley 3400 model series propeller is a constant speed propeller with composite propeller blades and a conventional aluminum propeller hub.
   (1) The C3400 Series is a three-blade constant speed propeller. (Refer to Figure 1).

CAUTION: Do not use the propeller blades for pushing or pulling or maneuvering an airplane on the ground. Damage may result to the propeller mechanism which may not be discernible by external visual examination of the propeller.

B. Each propeller consists of a hub assembly, composite propeller blades, piston and cylinder assembly.

C. Description of the Propeller Assembly Components:
   (1) Propeller Hub Assembly - The propeller hub is a single piece, hollow assembly with propeller blade sockets. Each blade socket to blade shank is O-ring sealed to prevent leakage. The rear hub face has threaded studs for attachment to the engine flange. The rear hub face also has dowels that mate with holes in the hub for alignment. These ensure proper mounting to the engine propeller shaft flange.
   (2) Propeller Blades - The propeller blades are made of a composite fiberglass/carbon fiber composite material around foam cores. Each propeller blade is match-balanced to the other blades within the propeller assembly.
      (a) The entire propeller assembly is static balanced as well, using balance weights mounted with screws to the cylinder balance ring.
   (3) Blade Retention - External retainers (outside the hub) secures each blade from moving inboard in the hub and a series of ball bearings and bearing races prevent the propeller blade from moving outboard during propeller operation. During pitch change, each blade rotates about its axis on a bearing assembly. An actuating pin on the blade butt is a part of the blade assembly. The actuating pin is driven by a bushing attached to the piston inside the hub cavity.
   (4) Piston and Cylinder Assembly - Oil pressure, controlled by the propeller governor, and an internal spring act on the piston to provide the forces necessary to accomplish propeller blade pitch changes. The cylinder is mounted to the hub face with screws and is sealed to prevent leakage.
   (5) Internal Lubrication - The propeller hub contains a red dyed oil. The hub cavity is partially filled with red dyed engine type oil which is sealed in the hub and isolated from the engine oil. This oil provides lubrication and corrosion protection to blade bearings and other internal parts. The oil is dyed red to aid in the troubleshooting of suspected propeller leaks.

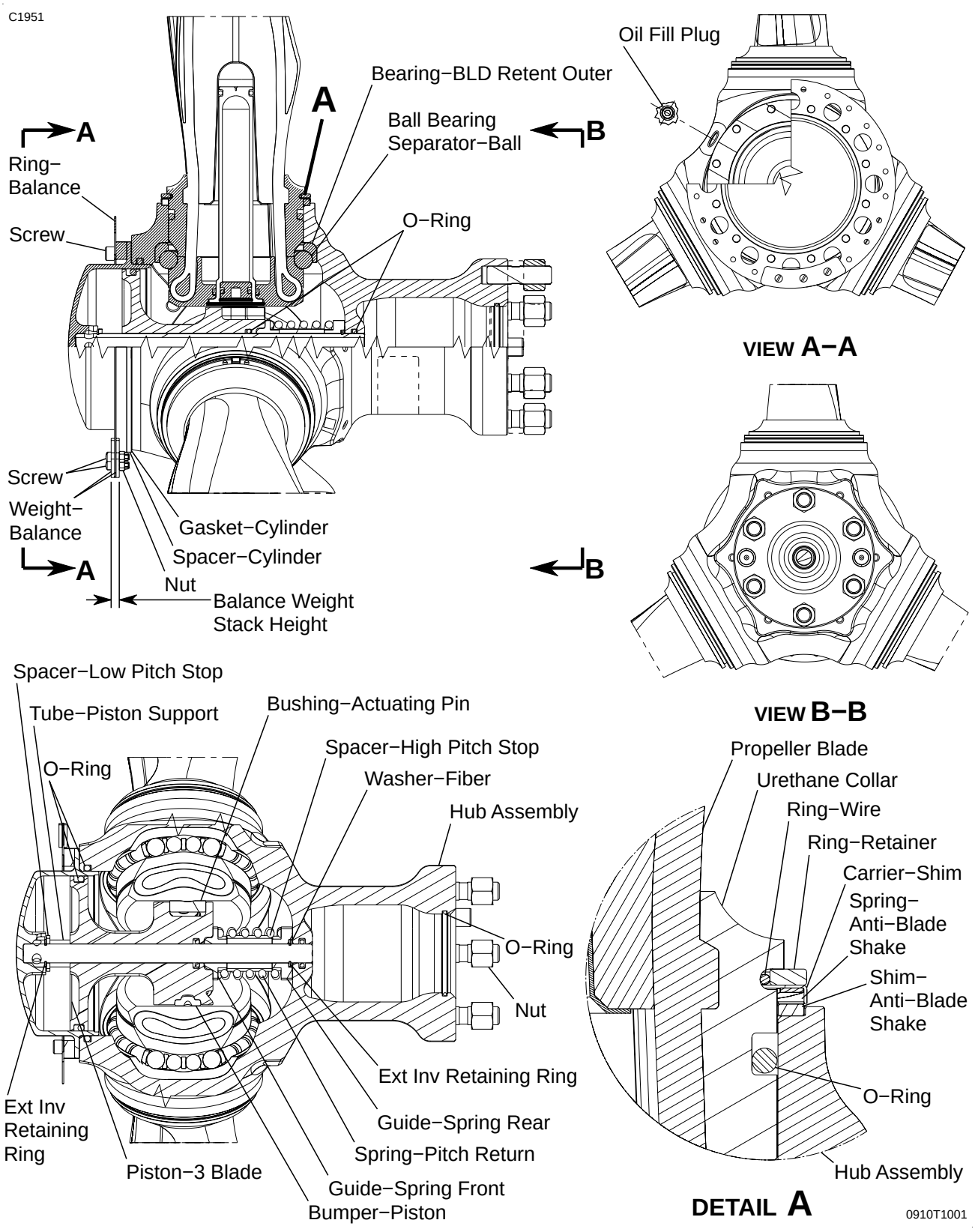
      NOTE: Periodic field maintenance of this lubrication is NOT normally required.

D. Description of Piston Engine Propeller Operating Principles
   (1) The C3400 model series propeller is a constant speed type. The propeller actuation is a single-acting piston and cylinder unit in which hydraulic pressure works against the forces of springs and the natural centrifugal moment of the rotating propeller blade to provide the correct pitch for engine load. Hydraulic pressure causes the blades to move toward high pitch (decreasing RPM). The springs and centrifugal moments cause the blades to move towards low pitch (increasing RPM).

E. Propeller Deice (Refer to Figure 2)

   NOTE: Refer to the airplane service or maintenance manual for a more detailed description of the propeller deice components.

   (1) If propeller deice is installed, the components include:
      - electrically heated rubber boots
      - deice harnesses
      - slip ring assembly
      - deice timer



C3400 Series Propeller
Figure 1 (Sheet 1)

- brush block assembly

(a) The brush block, deice harnesses, and slip ring assembly conduct electrical power to the propeller blade deice boot elements which then heat.

(b) The heat melts a layer of the ice which allows the remaining ice to be removed from the propeller blades by centrifugal force.

F. Propeller Deice Boots (if installed).

(1) The deice boots are constructed of fabric-reinforced, abrasion-resistant rubber. Electrical deice boots have a wire mesh or foil element that heats as current is supplied to the boot. A deice timer controls the current cycle that is applied to individual blades or boot segments. The outer surface of the deice boot that is exposed to the environment has a glossy finish, while the side that is bonded to the propeller has a dull, matte finish.

G. Deice Harness (if deice is installed) - The deice electrical harnesses connect the deice boots to the slip ring assembly to complete the deice electrical circuit.

H. Deice Slip Ring Assembly (if deice is installed) - The deice slip ring assembly is constructed of machined aluminum with bronze commutator rings bonded to one side. Studs to attach the deice leads for each blade are located on the propeller side of the platter. These are brazed to the commutator rings and pass through holes provided for that purpose. Slip ring assemblies may be secured to the hub, to the starter ring gear, or the alternator belt drive pulley.

I. For propellers equipped with an anti-ice system, refer to Anti-Ice System section in this manual.

NOTE: Refer to the airplane service or maintenance manual for a more detailed description of the propeller anti-ice components.

2. Overhaul Period

A. All propellers are to be overhauled at specific intervals. Refer to the Propeller Inspection section, Time Between Propeller Overhaul for required propeller overhaul intervals. Propellers shall also be overhauled or repaired as required for blade surface conditions.

3. Propeller Model Designation

A. McCauley uses a model designation system to identify specific propellers. This is done by utilizing a combination of hub and blade model designations.

B. Hub Model Designation.

(1) The hub model designation is steel stamped on the propeller hub. Refer to Figure 3 for an illustration of the hub model designation:

C. Blade Model Designation

(1) All blades are marked on the butt end with a blade model designation, propeller type certificate number, and blade serial number. This stamping is not visible from the outside of the propeller assembly. Refer to Figure 4 for illustrations of the propeller blade model designation blade stamping and an illustration of the propeller blade butt end.

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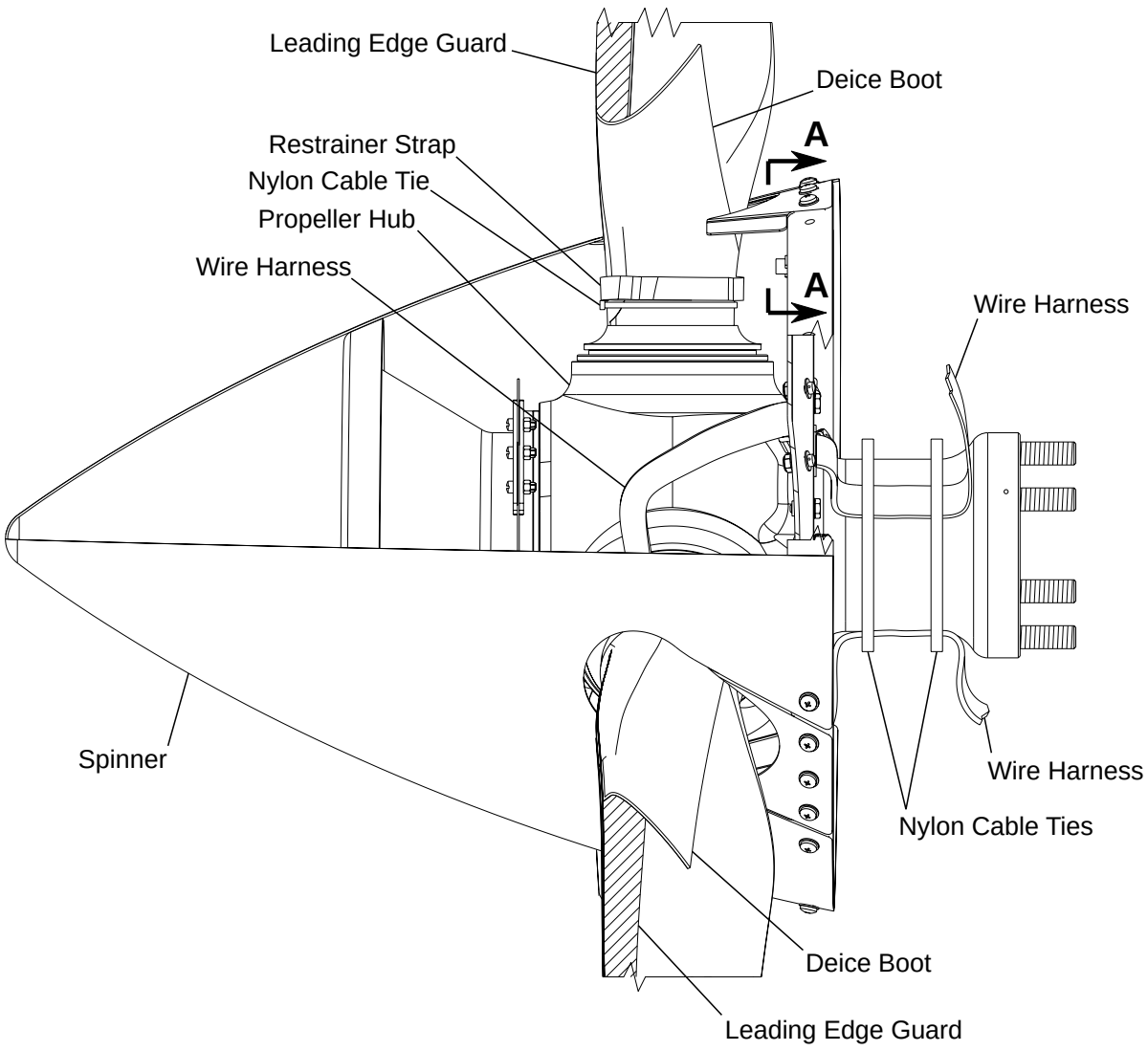

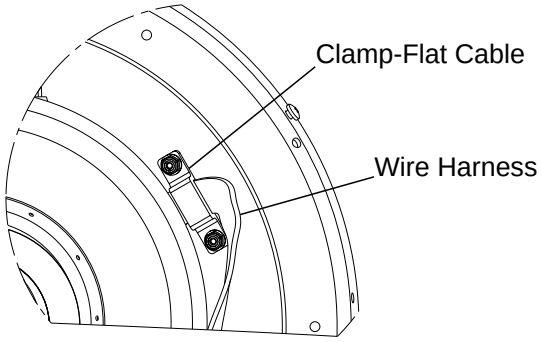

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Propeller Deice Installation
Figure 2 (Sheet 1)

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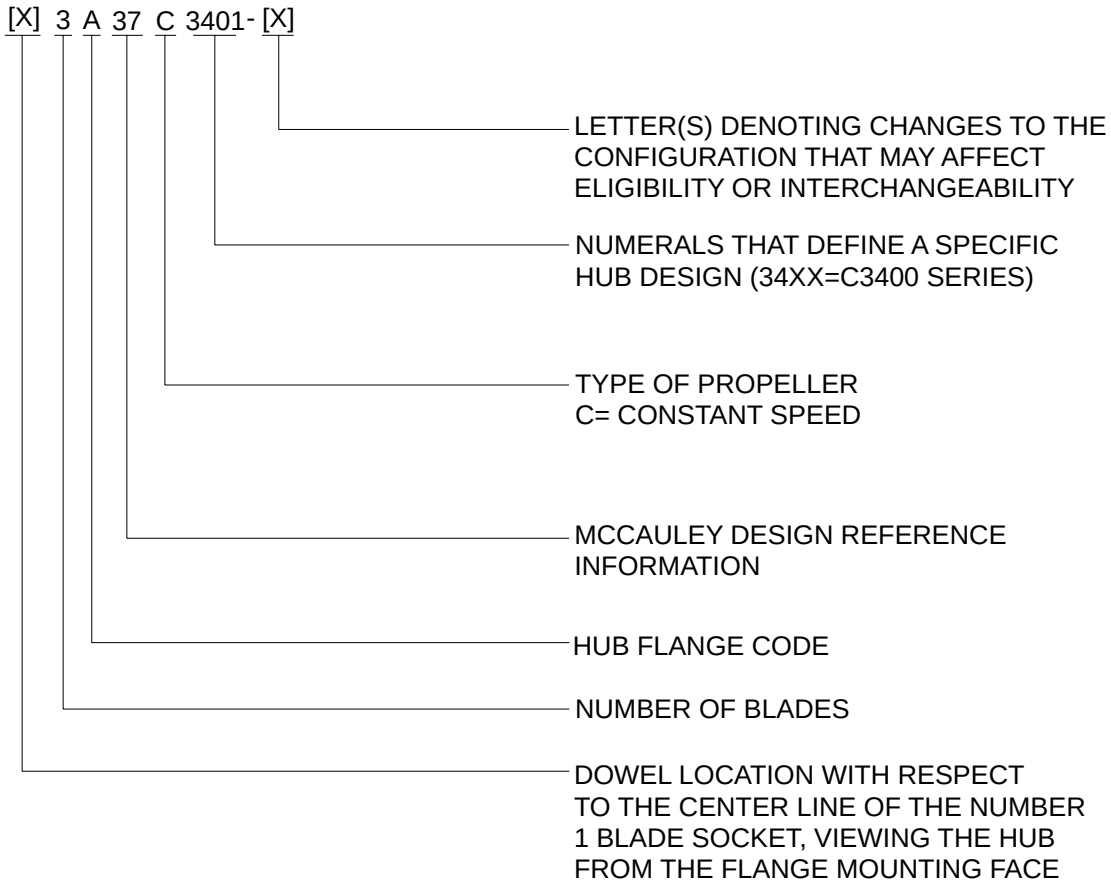
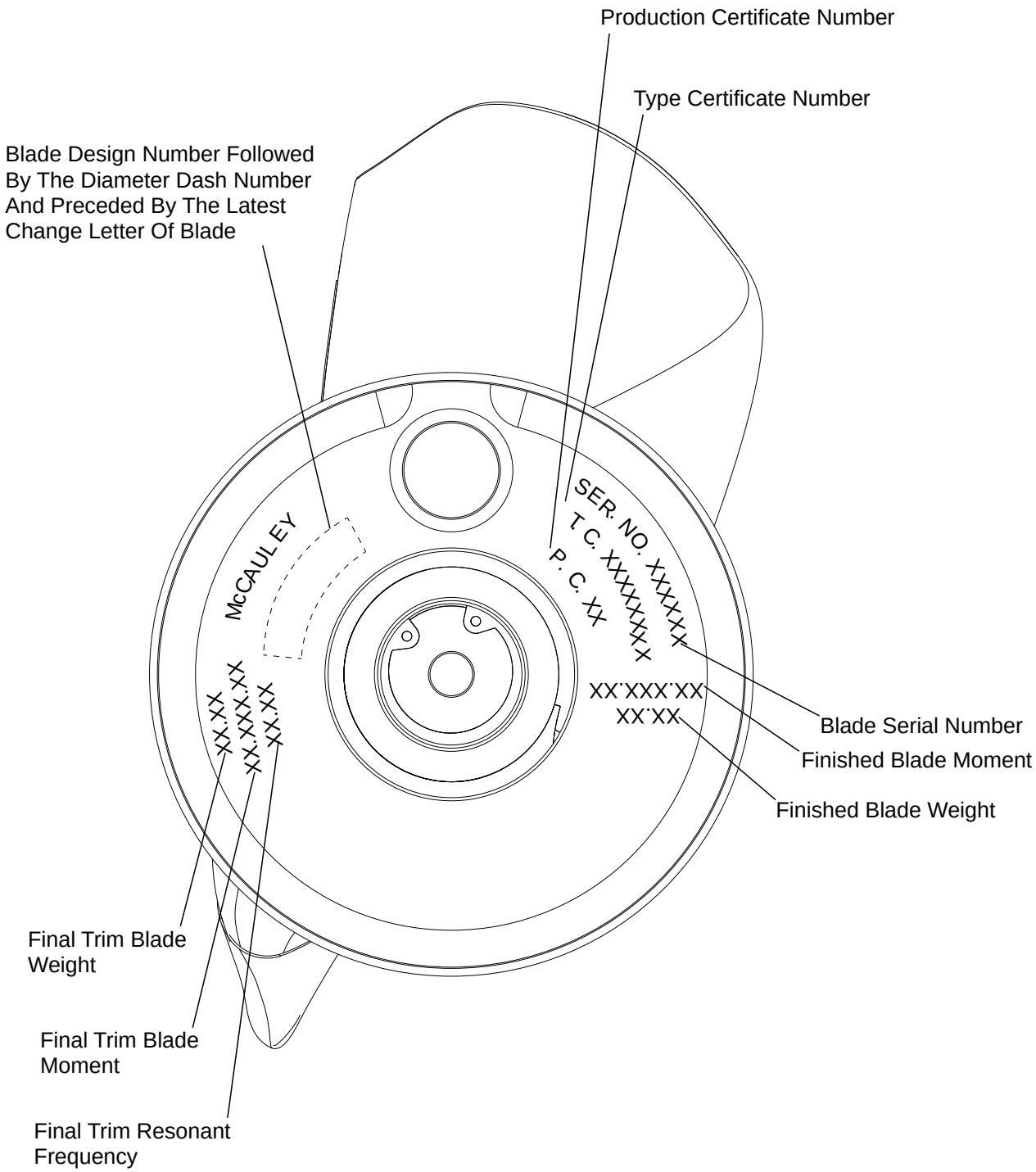
[X]3A37C3401-[X]- SAMPLE HUB MODEL DESIGNATION



NOTE: A SPECIFIC PROPELLER ASSEMBLY IS IDENTIFIED BY THE HUB SERIAL NUMBER WHICH IS STAMPED ON THE HUB. ALL RECORDS OF PROPELLER COMPONENTS ARE KEPT WITH REFERENCE TO HUB SERIAL NUMBER. THE FIRST TWO DIGITS OF THE HUB SERIAL ARE THE YEAR OF MANUFACTURE. THE REMAINING DIGITS ARE THE NUMBER OF THE HUB MANUFACTURED IN THAT YEAR.

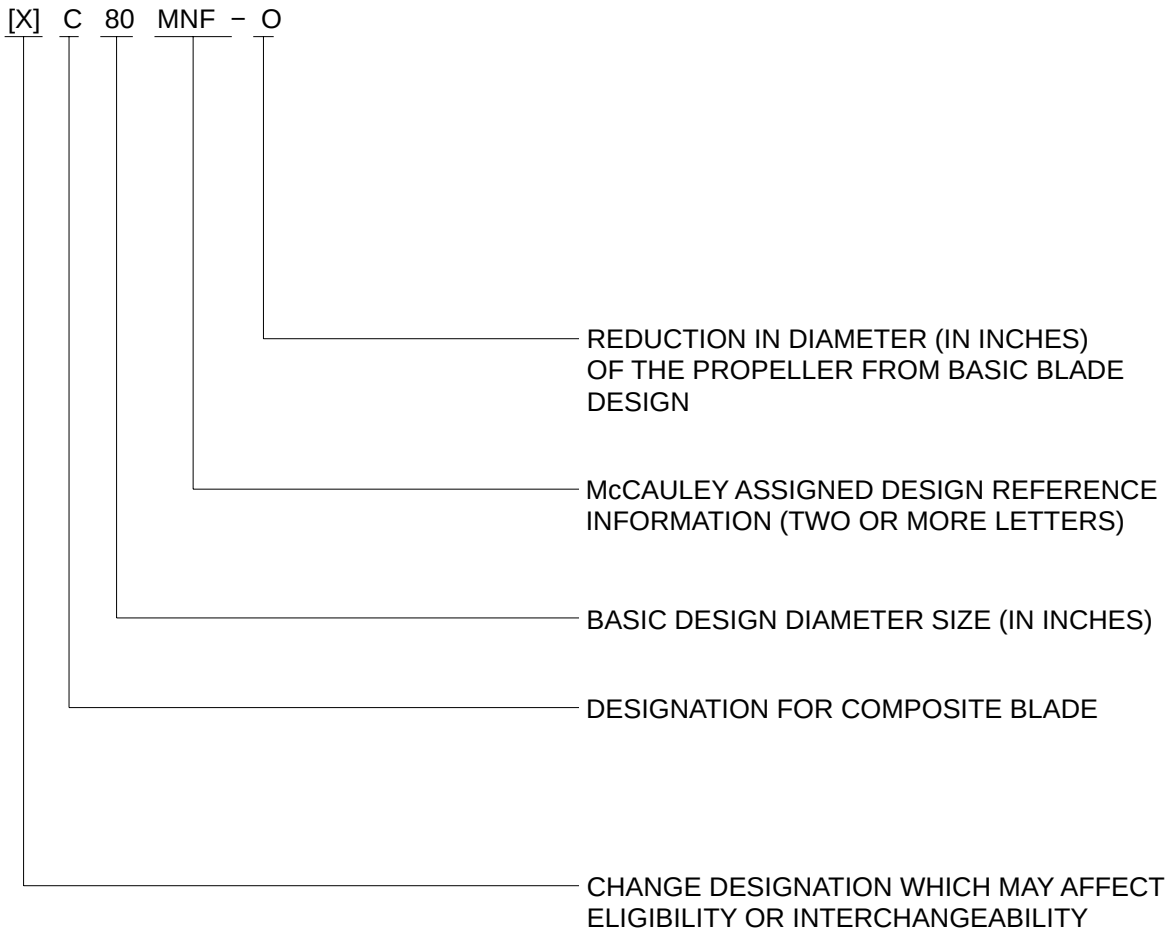
Propeller Model Designation Hub Stamp
Figure 3 (Sheet 1)

C2110



Propeller Model Designation
Figure 4 (Sheet 1)

C2150



Propeller Model Designation
Figure 4 (Sheet 2)

D. Propeller Assembly Configurations

(1) The following table provides a cross reference of propeller model numbers, part numbers and installed equipment.

Table 1. Propeller Part Number Cross Reference.

Propeller Model Number/Blade	Propeller Part Number	Spinner Assembly (Reference)	Deice Boot (As Required)	Anti-Ice Shoe (As Required)
D3A37C3401-[X] / [X] - C80MNF-2	P34017898-01	E-8093	NA	NA
D3A37C3401-[X] / [X] - C80MNF-2	P34017898-03	E-8049	NA	NA
D3A37C3401-[X] / [X] - C80MNF-2	P34017898-0330	E-8049	B-40746-30	NA
D3A37C3401-[X] / [X] - C80MNF-2	P34017898-0331	E-8049	B-40746-31	NA
D3A37C3401-[X] / [X] - C80MNF-2	P34017898-0381	E-8102	NA	C-40323-81
D3A37C3401-[X] / [X] - C80MNF-2	P34017898-04	E-8116-1	NA	NA
D3A37C3401-[X] / [X] - C80MNF-2	P34017898-0430	E-8116-2	B-40746-30	NA

PROPELLER TROUBLESHOOTING

1. General Information

A. Types of Problems Normally Encountered
   (1) This section outlines and explains a number of operating characteristics which have been observed in service. There is some discussion of propeller design as it relates to these characteristics. Procedures for locating and correcting causes of undesirable operation are given.

2. Propeller RPM Fluctuations

A. Symptoms:
   (1) Hunting is a cyclic or constant variation of engine speed, above and below that desired. It will be shown by constant wavering of the tachometer reading.
   (2) Surging is a wide or excessive increase or decrease in engine speed followed by return to the established speed after one or more oscillations.
   (3) Surging will occur and should be considered normal if lever/throttle is moved rapidly.

B. Possible Causes:
   (1) Hunting is seldom, if ever, caused by the propeller itself. Those conditions reported primarily have been caused by other parts of the system such as governor, fuel control, etc.
      (a) For piston engine installations, the propeller can be tested in flight by reducing the manifold pressure. The propeller control should be in the full RPM position and the manifold pressure should be reduced until the RPM drops slightly. This ensures that the propeller is against its low pitch stop and is eliminated from the equation.
   (2) Surging may be caused by air in the propeller control hydraulic system, governor not operating correctly, or problems associated with the engine transfer bearing or collar.
   (3) If the governor test is satisfactory and no other system faults can be found, the propeller may be at fault. Although very rare, hunting and surging may be due to excessive internal friction in the propeller or over-shimming of the propeller blades.

C. Corrective Action:
   (1) If the propeller is suspected as the cause, it should be removed for examination by a McCauley authorized service facility.
   (2) Surging has been encountered on ground operation after initial installation while purging air from the system.
      (a) If encountered at other times, the propeller should be cycled repeatedly to remove all air from the system.
      (b) If the condition persists, it may be attributable to the governor, and the governor should be removed and tested. The propeller should be purged of air again after the governor is reinstalled.

3. Changing RPM or Creeping

A. Propeller RPM changing and holding new setting.
   (1) Possible Cause:
      (a) Excessive "play" in the linkage between the governor and the cockpit control often leads to erratic operation.
      (b) Possible excessive engine compartment heat affecting the governor plastic top cover.
   (2) Corrective Action:
      (a) Trace linkage, locate unsecured sections, and tighten as needed.
      (b) Please note that although linkage may appear to allow full governor control while the engine is off, it may not in the air. Engine vibration and "stretch" of the mount during operation can often aggravate the condition. Therefore, it is important the entire length of linkage be properly secured.
      (c) If heat has distorted the plastic top cover, replace it with a new top cover and determine the source of the excessive heat.

B. Once RPM control and power settings are established for a flight attitude (cruise) and then the attitude is altered (to climb) without change of RPM and power settings, the engine RPM may change slightly.
   (1) Possible Causes:
      (a) This effect is commonly known as "creeping" of the RPM setting. It is a natural result and comes about in the following manner. When RPM and power settings are established, the governor control valve will be opened an amount to provide a pressure which balances the propeller rotational forces and spring load, and an oil flow which is determined by the leakage through the propeller pitch control bearing at that given pressure. This will maintain the blade angle such that set power may be absorbed at the desired RPM.
      (b) If the attitude of the aircraft is altered and the airspeed changes, the blade angle will change to absorb the power at this airspeed. This change in blade angle will cause the forces to vary and consequently will change the control pressure and the propeller pitch control bearing leakage rate.
      (c) Since the governor had been adjusted by the RPM control for the first set of conditions, the effect will be to change the effective equilibrium speed of the propeller with no change in governor setting. The amount of change varies with engine transfer bearing clearance.
      (d) This RPM change is generally a negligible amount and is not cause for concern since it is a normal reaction of the control system.
      (e) Control-friction lock in the aircraft is faulty.
   (2) Corrective Action:
      (a) If it is desired that the original RPM setting be maintained in the new flight attitude, it may be necessary to alter the propeller control lever as required after the aircraft is trimmed out.
         1 Refer to the aircraft maintenance manual for maintenance information affecting the propeller control friction lock.

4. Improper Propeller Static RPM

A. Incorrect propeller RPM at a given power and static RPM setting.
   (1) Possible Cause:
      (a) If maximum static RPM is incorrect, the problem can normally be attributed to either incorrect low blade angle or insufficient engine horsepower. However, if the maximum in-flight RPM is incorrect, then an adjustment of the governor may be necessary.

         NOTE: On static runs, the propeller should prevent the engine RPM from going to red line. This is done to prevent overspeeding and is a design characteristic of the propeller. However, it should be within 100 RPM of red line.

   (2) Corrective Action:
      (a) One area that is often at fault for indicated RPM problems is the tachometer. Aviation tachometers can be inaccurate, so begin troubleshooting by verifying the accuracy of the tachometer.
      (b) Verify the propeller low blade angles are correct. This is most effectively accomplished at a McCauley authorized propeller repair facility. This is done by measuring the blade angle at the reference station (generally the 30 inch (762 mm) station) and comparing the angles to those listed in either the type certificate of the airframe manufacturer or the STC under which the propeller was installed. If the angles are correct, then the engine is not producing the proper horsepower needed to make the rated static RPM.
      (c) Begin troubleshooting the engine.

5. Improper Propeller Maximum RPM in Flight

A. Incorrect propeller RPM with maximum RPM selected in flight.
   (1) Possible Cause:
      (a) Inaccurate tachometer reading.
      (b) Linkage is out of rig.
      (c) Governor stop screw requires adjustment.
   (2) Corrective Action:
      (a) Repair or replace the tachometer.
      (b) Governor stop screw requires adjustment.

1 Do a test flight.
2 Pull the propeller control back until it reaches redline RPM.
3 Allow the RPM to stabilize.
4 Land the aircraft without touching the propeller control lever.
5 Adjust the propeller stop screw to the propeller control location.
6 Rig the aircraft power controls in accordance with the instructions of the manufacturer.
7 Do another flight test to verify the correct setting.

6. Propeller Fails to Control

A. Propeller goes to low pitch (high RPM) of its own accord.
(1) Possible Cause:
(a) Governor linkage disconnected.
1 Corrective Action:
a Check and repair governor linkage.
(b) Engine transfer bearing/collar oil leakage rate exceeds specification.
1 Corrective Action.
a Check transfer bearing/collar oil leakage rate per the instructions of the engine manufacturer.
(c) Loss of engine oil pressure.
1 Corrective action:
a Verify the engine oil pressure in accordance with the instructions of the engine manufacturer.
(d) Obstruction in the crankshaft.
1 Correction action:
a Remove propeller and check for obstruction in the crankshaft oil gallery i.e. rags, shipping plugs, etc.).
(e) Internal governor problem.
1 Corrective Action:
a Have the governor checked by an FAA approved Part 145 Propeller Repair Station or international equivalent.

NOTE: Failure of an internal governor part may result in metal contamination in the engine oil lubrication system. If internal governor failure is confirmed, the engine and propeller should be checked for metal contamination in accordance with the specifications of the engine manufacturer.

B. Extreme sluggishness, failure to respond to changes in RPM setting or failure to hold constant RPM with varying aircraft attitude.
(1) Possible Cause:
(a) Obstruction in the engine crankshaft.
1 Correction action:
a Remove propeller and check for obstruction in the crankshaft oil gallery (i.e. Rags, shipping plugs, etc.).
(b) Internal governor problem.
1 Corrective Action:
a Have the governor checked by an FAA approved Part 145 Propeller Repair Station or international equivalent.

NOTE: Failure of an internal governor part may result in metal contamination in the engine oil lubrication system. If internal governor failure is confirmed, the engine and propeller should be checked for metal contamination in accordance with the specifications of the engine manufacturer.

(c) Internal Propeller problem.

1 Corrective action:
a Have the propeller checked by an FAA approved Part 145 Propeller Repair Station or international equivalent by personnel trained to overhaul McCauley composite propellers.

(d) Engine transfer bearing/collar oil leakage rate exceeds specification or rotated engine transfer bearing.
1 Corrective Action.
a Check transfer bearing/collar condition and oil leakage rate per the instructions of the engine manufacturer.

7. Vibration Troubleshooting

A. Troubleshooting vibration problems can be very challenging and time consuming. Most digital dynamic balancing equipment can also be used to track down vibration problems. The digital dynamic balancing equipment can display the amplitude and frequency of the vibration which will help determine the vibration source. While vibration problems are occasionally caused by the propeller, they are usually caused by other things. Below is a list of other possible sources of vibration:
(1) Engine
(2) Worn, old, cracked or loose engine mounts
(3) Cracked or loose engine mount structure
(4) Cracked or broken spinner bulkheads
(5) Loose or improperly mounted engine cowlings
(6) Loose cowl flaps
(7) Loose landing gear doors
(8) Out of balance elevators
(9) Loose control yokes
(10) Exhaust stack touching engine cowling
(11) Component in engine compartment that is touching engine cowling

8. Unusual Aircraft Vibration

A. Apparently excessive vibration felt during normal aircraft operation.

CAUTION: If a vibration starts suddenly and/or is accompanied by the leaking of red dyed oil from the propeller, determine the cause of the vibration and/or oil leakage before continuing propeller operation.

(1) Possible Causes:
(a) If the propeller is believed to be the cause of the vibration, it is typically due to improper balance, blade track, or linkage problems within the propeller assembly.
(b) When a propeller is the cause of vibration, the aircraft typically vibrates throughout the entire RPM range although the intensity of the vibration may vary with the RPM. If a vibration occurs at only one RPM or within a limited RPM range, the vibration is not normally due to a propeller problem.
(2) Corrective Action:
(a) If the propeller is suspected as the cause of the vibration, the following procedures should be performed:
1 The ideal troubleshooting method is to temporarily replace the propeller with one that is known to be good and is the same model and test fly the aircraft. If the vibration is eliminated, the propeller is highly suspect and should be sent to an FAA approved Part 145 Propeller Repair Station or international equivalent by personnel trained to overhaul McCauley composite propellers for evaluation.
2 If a replacement propeller is unavailable, check the following:
a Propeller imbalance can be the cause of vibration. Perform a dynamic balance on the propeller. If the propeller cannot be successfully dynamically balanced, it should be removed and sent to an FAA approved Part 145 Propeller Repair Station or international equivalent by personnel trained to overhaul McCauley composite propellers for evaluation.

b Check the spinner for cracks at the bulkhead attach points for a cracked bulkhead or for a cracked front support.

c The propeller spinner can be a contributing factor to an out of balance condition. An indication of this would be a noticeable spinner "wobble" while the engine is running. This condition is normally caused by inadequate shimming of the spinner bulkhead or a cracked or deformed spinner. If a spinner is found to be "wobbling", it should be removed and reinstalled with the proper amount of shims as described in, the Propeller Removal and Installation section. Any spinner found cracked must be replaced.

d Check amount of blade twist of each propeller blade when rotated within its socket as shown in Figure 601. Look for variations in the amount of movement of each blade in relation to the other blade(s).

e If excessive blade twist is found in one or more blades in relation to the others, the propeller could have an internal linkage problem. It should be removed and sent to an FAA approved Part 145 Propeller Repair Station or international equivalent for evaluation.

NOTE: The amount of total blade twist in each blade is, in itself, usually of no importance. It is a difference in the amount of blade twist from blade to blade that should be considered.

(3) Possible Cause:
(a) Worn engine mounts.
(4) Corrective Action:
(a) Consult the OEM or engine mount manufacturer manual for replacement criteria.

9. Blade Shake

A. Symptom:

NOTE: "Blade Shake" is listed in the "Propeller Troubleshooting" section of this manual for informational purposes only as it has been misinterpreted in the past as a possible problem by some operators. Despite it's appearance in this section, it should never be considered a cause for concern or propeller replacement. Refer to Figure 601 for an illustration of blade shake.

(1) Blade shake is the tendency for the blades to wobble slightly when the tip is physically moved by hand from the leading edge to the trailing edge.
(a) If there are no signs or indications of propeller damage, movement at the blade tip is considered normal.

B. Cause:
(1) This tendency is the natural result of a tolerance buildup. A very small movement at the hub is magnified many times at the blade tip. It is NOT normally the source of vibration or any other problems during propeller operation. While the propeller is rotating, centrifugal force on the blades seats them rigidly and positively against the retention bearings in the hub.

NOTE: A slight vibration might be encountered during engine startup and shut down until the centrifugal force is sufficient to seat the blades against the retention bearings in the hub.

NOTE: Propeller blade shake or "rock" with a McCauley C3400 series propeller at rest is considered normal. This propeller utilizes an anti blade shake spring that is unique to this model series of propeller. The anti-blade shake shim applies a preload to the blade retention system but will allow some "rocking" movement of the propeller blades when the propeller is not operating. During normal operation centrifugal force exerts a significant outward force on the blade retention system locking the blade in position and reducing rocking motions. However, when the propeller is at rest, it is possible to rock the blades within the hub sockets by applying hand pressure to the blades. This is not a cause for concern.

C. Corrective Action:
(1) No corrective action is required.

10. Oil Leaks

A. The presence of oil on propeller blades may or may not indicate a problem.
(1) All propeller blades may show minor grease streaking when new or newly overhauled. Such streaking is normal and is the result of lubricant applied to the blade O-ring during assembly.
(2) Oil-filled propellers may show signs of red oil deposited on the blade shank during operation after an overhaul or after a prolonged period of inactivity.

B. Checking and correcting a propeller leaking oil at the blade.

NOTE: This procedure will only correct blade shank leaks at the blade shank O-ring.

(1) Use a clean cloth dampened with mineral spirits to clean the blade of all traces of oil and dirt.

CAUTION: Never exceed the published engine operational limits.

(2) Run the engine and cycle the propeller at least five times.
(a) Cycle the propeller from low to high pitch.
(3) Check the blade for signs of continued leakage.
(a) If necessary, clean the blade again with a cloth dampened with mineral spirits to clean the blade of all traces of oil and dirt.
(4) Run the engine and cycle the propeller at least five times.
(a) Cycle the propeller from low to high pitch.
(5) If the leak has stopped completely, no other action is required.
(6) If the rate of leak has decreased, it is permissible to continue operation of the propeller for up to 20 hours.
(a) If there is leakage after 20 hours, the propeller must be removed from the aircraft and sent to an FAA approved Part 145 Propeller Repair Station or international equivalent for repair.
(7) If the rate of leakage increases, do not operate the propeller. Immediately send the propeller to an FAA approved Part 145 Propeller Repair Station or international equivalent for repair.

C. Oil leaks at locations other than blades.
(1) Piston aircraft propellers.
(a) Leakage from the cylinder area requires removal of the propeller and repair by an FAA approved Part 145 Propeller Repair Station or international equivalent.
(b) If leaks are found on any other spot on the blade or the hub, remove the propeller and have it repaired by an FAA approved Part 145 Propeller Repair Station or international equivalent.
(c) Leaks at the hub/propeller shaft interface requires removal of the propeller and replacement of the rear hub O-ring.

11. Propeller Overspeeding

A. During normal operation, the propeller suddenly overspeeds past rated RPM.
(1) Possible Causes:
(a) A number of factors can cause propeller overspeeding, but these are normally caused by the engine or governor.
(2) Corrective Action:
(a) Refer to Propeller Overspeed Inspection Requirements, for required action after an overspeed incident.

PROPELLER MAINTENANCE PRACTICES

1. Procedures For Maintenance

A. Maintenance begins with the operator and includes inspection together with regular care. Many maintenance tasks that may be accomplished at a minimum cost can extend the life of the propeller and reduce or prevent costly repairs. The following is a listing of what operators of aircraft CAN and CANNOT do.

B. Operators CAN do the following:

NOTE: The following activities are not preventive maintenance activities as defined by Title 14 of the Code of Federal Regulations, Part 43. Appendix A, Major Alterations, Major Repairs, and Preventive Maintenance.

(1) Perform a visual preflight inspection of the blades for nicks, scratches, dents, erosion, delamination, cracks, etc. Apparent damage found should be referred to an appropriately rated mechanic. A crack or delamination may be cause for the removal of the propeller.
(2) Check the propeller spinner attaching screws for security and check the spinner for damage.
(3) Check the propeller for evidence of oil leakage.
(4) Clean propeller blades periodically using fresh water, a non-alkaline cleaner and a soft cloth or soft brush. Dry with a soft cloth.

CAUTION: Do not use solvents to clean the propeller blades.

(a) Make sure the blade that you are cleaning is pointing down.
(b) Do not spray the mild soap and water solution into the blade retention area because water may be forced into the hub.

CAUTION: Do not power wash the propeller, as water may be forced past the blade O-rings. Water inside the hub will cause corrosion and may cause propeller failure.

(5) Ensure that the tachometer is appropriately marked for operational limitations of the propeller and that the tachometer accuracy is checked at periodic inspection intervals.
(6) Make sure that the applicable installation, information, and warning decals are on the propeller. These decals may include warnings against pushing or pulling on the propeller, the model number, the correct bolt torque, and dynamic balancing information.
(7) Make sure each propeller has its own maintenance record.
(8) The operator must arrange for the overhaul of the propeller when it reaches the McCauley recommended service time limits. Refer to Time Between Propeller Overhaul for required propeller overhaul intervals.
(9) For safety and glare reduction for conventional single-engine tractor type aircraft, make sure the face (back) side of each propeller blade is painted flat black and the propeller tips on the camber (forward) side of each blade are painted with the appropriate colors to ensure good visibility. Make sure that any propeller paint touch up is done equally to each blade so that the balance of the propeller is not disturbed.
(10) McCauley spinners can be polished, use commercially available polishing compounds.

C. Operators CANNOT do the following:

NOTE: The following is a listing of actions that shall not be performed on or subject a McCauley propeller or component to.

(1) Do not operate any aircraft after the propeller has been subjected to impact damage without a thorough inspection and has been approved for return to service by an appropriately rated person or repair facility.
(2) Never repair any blade defect by heating. This can induce premature blade failure.

(3) Never chrome plate a spinner. Plating will cause cracks and spinner failure.
(4) Do not attempt to repair or modify a propeller spinner or spinner components. Welding, riveting or bonding are not permitted on the spinner or spinner components.
(5) Do not fill any damaged areas of blades with bulk-filler materials such as epoxy or auto body fillers. This prevents areas of damage from being inspected.
(6) Do not paint or bondo over areas of damage on blades. Damaged areas must be repaired in accordance with approved procedures prior to applying the approved protective finish.
(7) Do not run up engines in areas containing loose rocks, gravel, or debris. Avoid quartering rear winds during ground run-up because this activity can cause damaging stresses.
(8) Do not push or pull on propeller blades when moving the aircraft by hand. Tow bars are specifically designed for this operation.
(9) Never install a propeller on an aircraft unless it is a model approved by the aircraft type certificate data sheet (TCDS) or an appropriate supplemental type certificate (STC). The service history must be properly documented, and a pre-installation inspection must indicate that the propeller is airworthy.

2. Long Term Storage of Propeller

A. The following is applicable to new and overhauled propellers prior to entering service (engine installation) or at any time the propeller is removed from service. Storage time is determined from date of manufacture, overhaul, or removal from aircraft.
(1) Storage must be in a clean and dry environment, preferably in the original shipping carton and above ground level, to minimize exposure to dirt and moisture.
(2) Make sure there is a protective cover over the propeller hub mounting flange.
(3) If the storage period exceeds three years before entering service or returning to service perform the following inspection:
(a) Inspect externally for damage and corrosion. Inspection may be accomplished by an A&P mechanic or international equivalent. Make a logbook entry stating compliance with this inspection requirement. Make a reference to the MPC27 and include the current revision level of this manual with the logbook entry stating compliance with this inspection requirement.
1 If corrosion is found on the propeller, refer to the Propeller Inspection/Check, Limitations section for additional inspection requirements.
(4) For all propeller models, if the storage period exceeds six (6) years, before entering service or returning to service, perform the following inspection and parts replacement:
(a) Disassemble as necessary to replace all rubber seals and lubricants. Total disassembly is not required unless evidence of corrosion warrants further disassembly. This must be accomplished only by an FAA approved Part 145 Propeller Repair Station or international equivalent in accordance with the propeller overhaul manual. Make a logbook entry stating compliance with this inspection requirement. Make a reference to the MPC27 Owner/Operator Information Manual and include the current revision level of this manual with the logbook entry stating compliance with this inspection requirement.
(b) Inspect parts for damage and corrosion, repair/replace parts as necessary. Work must be accomplished only by an FAA approved Part 145 Propeller Repair Station or international equivalent in accordance with the appropriate propeller overhaul manual. Make a logbook entry stating compliance with this inspection requirement. Make a reference to the MPC27 and include the current revision level of this manual with the logbook entry stating compliance with this inspection requirement.

3. Dynamic Balance

NOTE: Some aircraft manufacturers do not approve dynamic balance of the propeller because of potential crack damage to the spinner bulkhead from the added balance weight.

A. Recommended test equipment.

NAME	NUMBER	MANUFACTURER	USE
Balance Analyzer	Model 2020 Pro Balancer Analyzer	ACES Systems 10737 Lexington Drive Knoxville, TN 37932-3294 Web: www.Acessystems.com	For propeller dynamic balance

B. It is highly recommended that this procedure be performed following static balancing. All of the procedures and guidelines listed below should be used in conjunction with the dynamic balance equipment manufacturer's instructions.
   (1) Perform dynamic balance according to balance equipment manufacturer's instructions.
   (2) If the initial reading is over 0.8 ips, McCauley recommends the following should be checked/ corrected:
      (a) Shimming of the spinner shell.
      (b) Propeller installation (properly torqued and installed flat against the mounting flange).

      NOTE: If the shimming of the spinner shell and propeller installation are found to be acceptable but the initial reading is still over 0.8 ips, we recommend the propeller be taken to an FAA approved Part 145 Propeller Repair Station or international equivalent for inspection.

   (3) If the initial reading is under 0.8 ips, continue the dynamic balance in accordance with the balance equipment manufacturer's instructions.

      CAUTION: At no time are static balance weights to be moved to adjust dynamic balance.

   (4) If the test indicates the addition of weights is required, add weight (screw and washer(s) to one of six places on the aft side of the spinner bulkhead at the location closest to the area indicated by the testing equipment.
      (a) An AN970-3 washer weight = 0.144 ounces each (4.1 grams) plus screw (AN502-10-X)

      NOTE: If access to the aft side of the spinner bulkhead is difficult, it is permissible to temporarily remove a propeller spinner mounting screw and place the indicated mass of balance washers at the location indicated by the testing equipment.

   (5) Repeat the dynamic balance until the correct balance level (approximately 0.07 ips or lower) is achieved.

      NOTE: Most dynamic balance equipment manufacturers specify 0.15 - 0.2 ips as being an acceptable level. McCauley Propeller Systems agrees that 0.15 - 0.2 is an acceptable level, but our experience has shown that 0.07 ips or lower is noticeably smoother.

   (6) When dynamic balance is satisfactory:
      (a) Remove balance washers and screw from the spinner attach screw hole.
      (b) Permanently mount the balance washers and screws to the spinner bulkhead assembly at a point adjacent to the test location as shown on Figure 201.
   (7) If applicable, return original spinner screw to hole.

4. Spinner Repair and Chrome Plating

A. No repair is permitted on any McCauley spinner, spinner front support, or spinner bulkhead. Follow these guidelines to determine if a part is airworthy:
   (1) If the part has scratches and minor dents, the part can continue to be used.
   (2) If the part is cracked, the part must be replaced.

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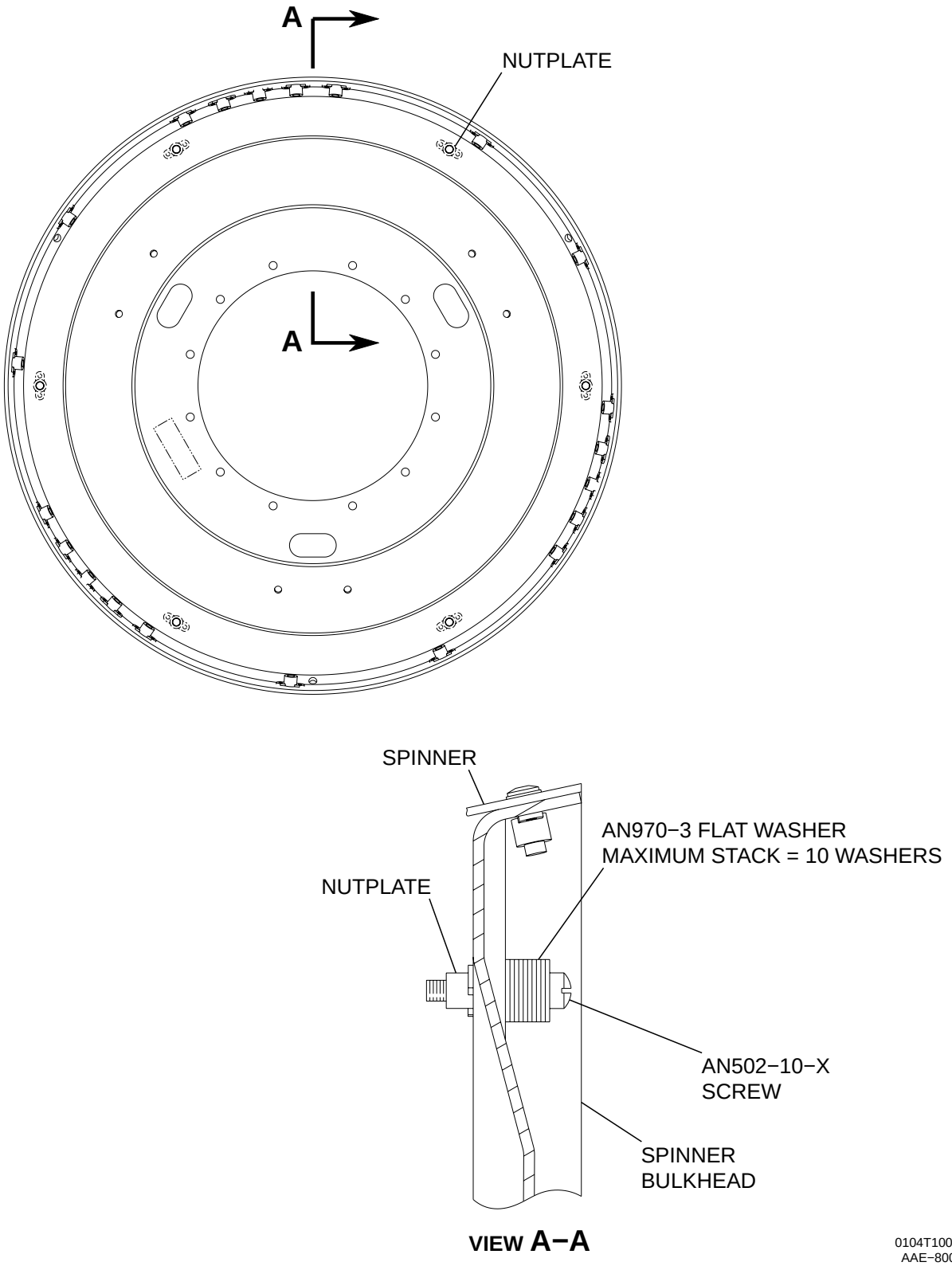

Balance Weight Installation
Figure 201 (Sheet 1)

B. McCauley does not approve the chrome plating of McCauley propeller spinners. Field experience has shown that chrome plated spinners often peel after a short time in service. Strong evidence also exists that chrome plating can lead to spinner fatigue cracking, thus scrapping the spinner shell. Chrome plating will void the McCauley warranty.

5. Propeller Internal Lubrication

A. Servicing of Propeller Internal Lubrication
(1) General
(a) Unless significant oil leakage is observed, periodic servicing of the oil in McCauley oil filled propellers is not necessary.

6. Deice Boot Removal and Installation

A. Remove Propeller Deice Boots.

WARNING: Cement and solvent vapors are toxic and extremely flammable. Use these chemicals only in a well ventilated area away from sparks and vapors. Excess exposure could cause injury or death. If dizziness or nausea occur, get to fresh air immediately. Avoid contact with skin or eyes. Use solvent-resistant gloves to minimize skin exposure. Use safety glasses to protect your eyes from chemicals. If you get chemicals in your eyes, flush your eyes with water for 15 minutes and see a physician immediately. If you get chemicals on your skin, wash thoroughly with soap and water. If you swallow chemicals, do not induce vomiting. See a physician immediately. Before work is started, always refer to the Material Safety Data Sheet (MSDS) for all chemicals used to remove and install the deice boot(s).

(1) Cut the sta-straps and disconnect boot electrical lead from the slip ring.

NOTE: McCauley does not recommend the reinstallation of a deice boot that has previously been in service.

NOTE: All of the deice boots currently used on McCauley constant speed composite propellers are of the integral lead type design. No detachable lead type deice boots are currently used on McCauley constant speed composite propellers.

CAUTION: When removing boots from a complete propeller assembly, care must be taken to prevent solvent from leaking into the propeller hub and causing damage to the seals. The blade being worked on should be pointed down so all excess solvent will run to the outboard tip of the blade. As an extra precautionary measure, the hub and blade area should be masked. Do not use any sharp objects which might scratch the blade when removing the boot.

(2) Using methyl n-propyl ketone or toluol to soften adhesion line between the deice boot and propeller blade, start at one corner, loosen enough of the boot to grasp with vise grips, pliers, or similar tool.
(3) Apply a steady pull to remove boot; pull the boot from the blade slowly and carefully while continuing to use a liberal amount of methyl n-propyl ketone or toluol to soften the adhesion line.

(4) Remove all residual cement, edge sealer and epoxy from the blade. Use solvents with caution as mentioned above.
(5) Visually inspect the propeller blade for damage or deterioration. Check for delamination, cracks, dents or nicks. If defects are found, the propeller must be repaired by an authorized propeller repair station.

B. Propeller Deice Boot Installation.
(1) These instructions describe the procedures to be followed for the installation of electrothermal propeller deice boots on McCauley propeller blades.

CAUTION: The condition of the propeller blades and the deice boot installation must comply with applicable FAA regulations. Inspect each propeller blade prior to deice boot installation for any delamination, cracks, dents, or nicks. If any defects are found, the blade must be repaired by an FAA approved Part 145 Propeller Repair Station or international equivalent by personnel trained to repair McCauley composite propeller components prior to the installation of the deice boot. Check resistance of each heating element before installation of the deice boot. Refer to Table 202 for deice boot resistance values.

(2) All deice boots on a single propeller must be located the same distance from the center line of the propeller for rotational balance. The ("Y") dimension for the location of the deice boot is given in Table 201 and shown in Figure 202.

Table 201. Aircraft and System Identification and Information

Normal Total Nominal Power (Watts)	Dim "Y" See Note 1	Dim "X" See Note 1	McCauley Propeller Model No. / Deice Boot Part No.	Notes
120*	1.302 to 1.428 Inch (36.27 to 33.07 mm)	0.187 to 0.313 Inch (4.75 to 7.95 mm).	D3A37C3401 / B-40746-30	3 blade prop, integral leads, single engine, single element, 28 VDC deice boot heating element.
120**	1.302 to 1.428 Inch (36.27 to 33.07 mm)	0.187 to 0.313 Inch (4.75 to 7.95 mm).	D3A37C3401 / B-40746-31	3 blade prop, integral leads, single engine, single element, 14 VDC deice boot heating element.
* Based on 24 to 28 VDC at deice boot leads.				

Table 201. Aircraft and System Identification and Information (continued)

Normal Total Nominal Power (Watts)	Dim "Y" See Note 1	Dim "X" See Note 1	McCauley Propeller Model No. / Deice Boot Part No.	Notes
** Based on 12 to 14 VDC at deice boot leads.				
NOTE 1: Deice Boot Restrainer Strap Location Dimension "X" (Inches) and Deice Boot Location "Y" (Inches). See Figure 202.				
NOTE 2: Many McCauley propellers are provided to the aircraft manufacturer without the deice boots installed. In cases where the aircraft manufacturer installs the deice boots, or where non-McCauley deice boots are used, the appropriate aircraft manufacturer's service manual must be consulted for all installation information.				

Table 202. Deice Boot Resistance Values

McCauley Deice Boot Part No.		RESISTANCE VALUES (ohms) Boot Ea. Element (Note 1)	
		Max.	Min.
B-40746-30		5.04	4.56
B-40746-31		1.26	1.14

If the propeller is installed on an aircraft, the propeller deice circuits must be electrically isolated from the rest of the aircraft wiring when making the above resistance check.

NOTE 1: Remove the deice boot leads from the brush block terminals.

Compare with the above table for minimum and maximum values in ohms between the common ground and the other terminal of the deice boot lead. Reinstall the deice boot leads in accordance with the airplane service or maintenance manual instructions.

(3) The propeller deice boot is an integral strap deice boot that uses a separate rubber restrainer strap at the inboard end of the boot to prevent loosening of the deice boot bond when centrifugal force acts on the lead strap. The procedure for installing the restrainer strap is given in Figure 202. Refer to Table 201 for the "X" and "Y" dimensions for locating the restrainer strap and illustrated in Figure 202.

C. Materials Required.

- B-40746-30 or B-40746-31 Deice Boot (McCauley, 1 each per propeller blade, all propeller blades must have same part number boot installed.)
- B-40251 Restrainer Strap (McCauley, 1 each per propeller blade)
- A-20360-3 Nylon Cable Tie (McCauley, 1 each per propeller blade)
- A-20360-4 Nylon Cable Tie (McCauley, 2 each per propeller assembly)
- Cement 1300L (Minnesota Mining and Manufacturing Co., St. Paul, Minnesota)
- Epoxy, A-1664-29 epoxy cement or A-1664-30 epoxy cement.
- Sunbrite-Sterling Industrial Finishes (Sterling Lacquer Manufacturing Co., St. Louis, Missouri) 78-U-1003 or 78A-1003 brushable black enamel
- Enamel catalyst U-1001-C.
- Cleaning solvent - MPK (Methyl n-Propyl Ketone) or acetone
- Tackifying Solvent - Toluol or MPK (see following note)
- Cleaning cloth - any clean, lint-free cloth
- 1 inch paint brushes
- 0.25 inch metal hand stitcher
- 2 inch rubber or wooden hand roller
- Fine Line Tape No. 218, (Minnesota Mining and Manufacturing Co., St. Paul, Minnesota)

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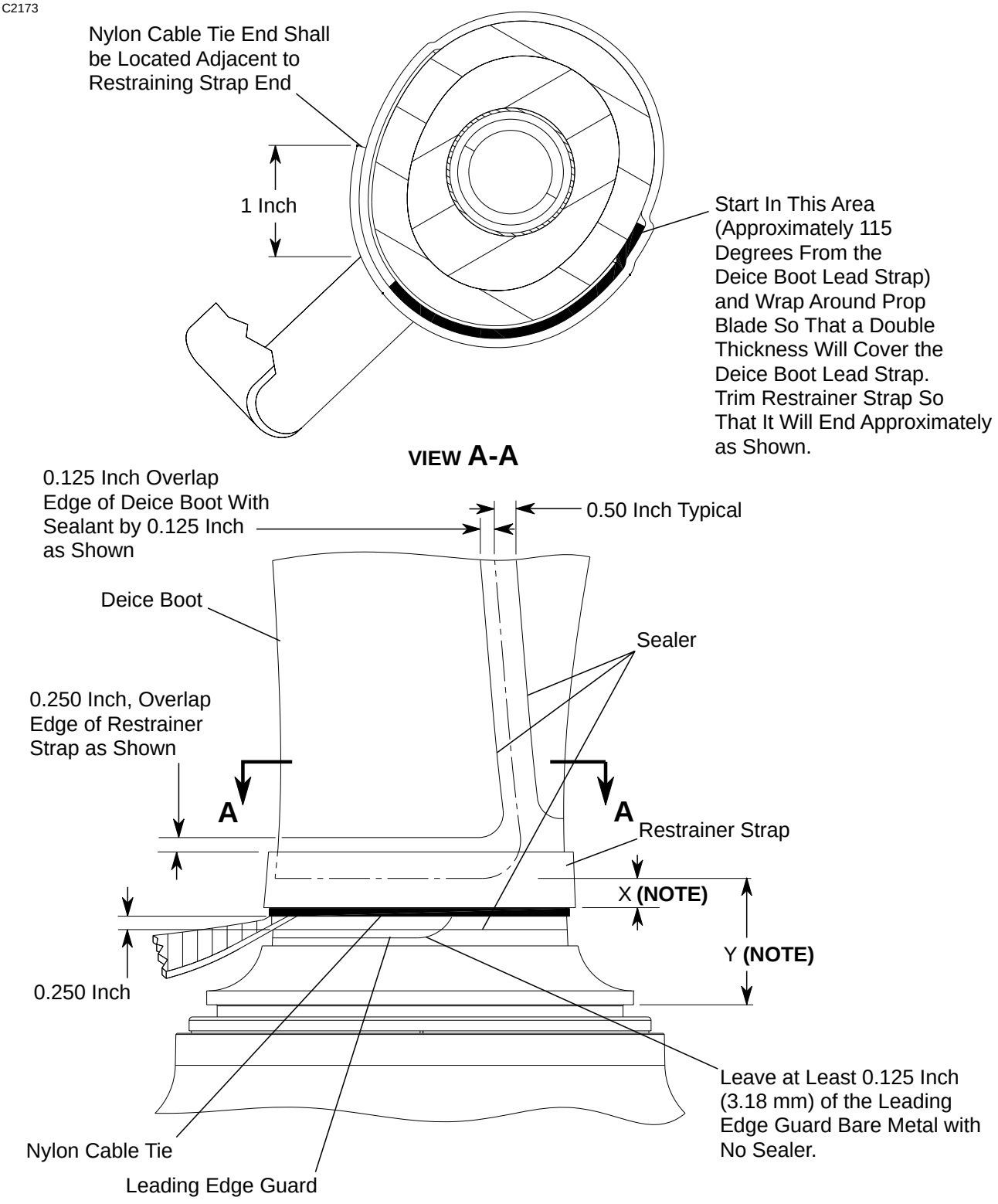

NOTE: Refer to the aircraft and system identification and information table.

0103T1015
AA0103T1015

Restrainer Strap Installation (Used Only On Integral Lead Type Deice Boots)
Figure 202 (Sheet 1)

- Masking tape

NOTE: MPK may be used instead of Toluol to tackify cement. Toluol provides approximately 40 seconds of working time.

D. Blade Preparation
   (1) Refer to Table 201 "Y" dimension for proper location of the deice boot.
   (2) Outline area to be masked using a red pencil. Area may be marked off using a template or by hand fitting a deice boot to the blade. Deice boots which use integral type lead strap must be marked for lead strap alignment.
   (3) Align deice boot with lead strap marks and center the outboard end of the deice boot on the lead edge of the blade. Once the deice boot is positioned, mark an area 0.5 inch outside of the boot perimeter. Using masking tape, mask around the outline.
   (4) On blades painted with polyurethane paint, lightly sand within the masked off area using 400 grit sandpaper. Clean entire masked area thoroughly with MPK or acetone. For final cleaning, quickly wipe off solvent With a clean, dry, lint-free cloth to avoid leaving a film.
   (5) Apply a second layer of masking tape to cover an additional 0.125 inch (3.18 mm) **inside** of the previously masked area.

E. Cement Application

CAUTION: Cleanliness of the propeller blade and rubber parts cannot be overemphasized. Only very clean surfaces will assure maximum adhesion.

   (1) Moisten a clean cloth with MPK or acetone. Clean the unglazed (back) surface of the deice boot and surfaces of the restrainer strap. Change the cloth frequently to avoid contamination of the clean area.
   (2) Thoroughly mix the cement.

NOTE: To prevent curling of the deice boot edges, apply masking tape to the edges on the smooth side before applying cement to the fabric impressioned side. Remove tape from the deice boot before starting installation.

   (3) For best results, apply cement and make deice boot installation at room temperature 65 to 75°F (18 to 24°C) Apply one, even, brush coat of cement to the clean, masked surface of the propeller blade and the fabric impressioned side of the deice boot. Also, when installing an integral lead strap type deice boot, apply cement to proper length of deice boot lead strap so that strap will be cemented to the blade. Allow cement to air dry for a minimum of one hour at 40°F (4°C), or above, when the relative humidity is less than 75%. If the humidity is 75% to 90%, additional drying time will be required to cure cement. Do not apply cement if relative humidity is higher than 90%. After cement is dry (not tacky), apply a second, even, brush coat of cement to the deice boot.
   (4) Apply an even brush coat of cement on the clean, masked off surface of the propeller blade immediately after the second coat of cement has been applied to the deice boot. Timing is important because the cement on both surfaces must reach the tacky stage at the same time.

F. Installing Deice Boot
   (1) When cement coats are tacky dry on both blade surface and deice boot surface, locate deice boot leads with lead strap with alignment marks previously made. Tack the deice boot center line to the leading edge of the blade, starting at the inboard end working toward the tip. If cement dries, use the tackifying solvent as necessary. If the deice boot is allowed to get off course, pull up with a quick motion and reapply boot. If cement is removed from either surface, completely remove the boot and reapply cement. Use tackifying solvent as necessary to reinstall the boot. When correctly positioned, press firmly with rubber or wooden hand roller along full length of propeller blade leading edge to form a tight bond.

(2) Gradually tilt roller over either side of leading edge contour to avoid trapping air. Roll from leading edge of blade toward the trailing edge. Work a small section at a time, starting at the inboard section of the blade and work towards the tip. Work all excess boot material out to perimeter before moving to the next section. If excess material at boot edges tends to lift the edges of the boot away from the surface of the blade, use your fingers to carefully work the lifted areas smooth.
(3) Remove the masking tape that was installed as a second layer of masking tape to cover an additional 0.125 inch (3.18 mm) **inside** of previously masked area marking the 0.5 inch (12.7 mm) boot permitter.

NOTE: Do not apply the sealer until the retaining strap is installed.

G. Remove any excess 1300L adhesive from the blade in the area surrounding the installed deice boot.
(1) Use a cloth dampened with Methyl n-Propyl Ketone (MPK) to wipe off the excess adhesive.
(2) Check the deice boot resistance values, refer to Table 202 for boot resistance values.

H. Restrainer Strap Installation (Refer to Figure 202).
(1) Apply 0.5 inch (12.7 mm) wide fine line tape to the blade to shank intersection.
(a) Make sure the tape extends onto the painted surface of the blade approximately 3/16 inch (4.5 mm).
(2) Determine the installed position of the restrainer strap.
(a) The restrainer strap shall be located on the propeller blade with the inboard (propeller hub side) of the strap located inboard of the deice boot in accordance with dimension "X" given in Figure 202.
(b) Apply masking tape approximately 3/16 inch (4.5 mm) outboard of the outboard edge of the intended restrainer strap position.

NOTE: On integral lead strap type deice boots a separate rubber restrainer strap is used at the inboard end of the boot to prevent loosening of the deice boot bond when centrifugal force acts on the lead strap. The procedure for installing the restrainer strap is given in Figure 202 and Table 201. .

(3) Thoroughly clean the area between the fine line tape and the masking tape with a cloth dampened with MPK.
(4) Clean the inner surface of the restrainer strap.
(5) Apply adhesive to the inner surface of the restrainer strap and the area between the masking tape and fine line tape and allow to dry for approximately 15 minutes.

NOTE: Do not apply adhesive closer than 0.25 inch (6 mm) to the fine line tape on the blade shank.

(a) Make sure the adhesive is dry, not tacky.
(6) Apply a second coat of adhesive to the blade and restrainer strap.
(7) Immediately install the strap in the correct location.
(a) Allow the adhesive to thoroughly dry (approximately 15 minutes) and make sure the restrainer strap is secure.
(8) Remove any excessive adhesive with a cloth dampened with MPK.

I. Nylon Cable Tie Installation
(1) Install nylon cable tie in the same orientation as the restraining strap.
(2) Position the nylon cable tie over the deice boot lead and adjacent to the deice boot restraining strap.
(3) Make sure the ends of the nylon cable tie are adjacent to the exterior end of the restrainer strap.
(4) Pull the nylon cable tie tight.
(5) Cut/remove excess nylon cable tie material from nylon cable tie end.

J. Epoxy Adhesive Application Over Restrainer Strap and Nylon Cable Tie

NOTE: Read the following instructions carefully before you begin the epoxy application.

NOTE: Do not attempt to mix more epoxy than is required for one blade.

(1) Mix approximately 1/3 tube (1/3 ounce (9.4g)) of epoxy A-1664-29 epoxy or 1/5 (5.7g) ounce of A-1664-30 epoxy.
(2) Use an acid brush to quickly apply a thin coat of the epoxy from the outboard masking tape, inboard through the inboard adhesive line remaining from the cable tie installation.

NOTE: The A-1664-29 epoxy will begin to set very quickly (approximately 3 minutes from mixing), and therefore must be applied as quickly as possible.

NOTE: The A-1664-30 epoxy has an approximate 30-minute cure time.

(a) The epoxy does not need to extend all the way to the fine line tape at the blade shank.
(b) The epoxy is applied only from inboard of the nylon cable tie to just outboard of the restrainer strap. Make sure the entire restrainer strap and nylon cable tie is covered in epoxy.

(3) Do not "over brush" the epoxy. Brushing the partially cured epoxy will produce brush marks.
(4) Immediately after the epoxy is applied, remove the outboard masking tape. Do not remove the tape applied for application of the edge sealant enamel.
(5) Allow the epoxy to cure.
(a) Allow 10 minutes for A-1664-29 epoxy.
(b) Allow 60 minutes for A-1664-30 epoxy.
(6) Properly dispose of the acid brush immediately. Do not try to reuse the acid brush on another blade.

K. Sealant Application
(1) Apply masking tape approximately 0.125 to 0.25 inch (3.18 to 6 mm) outboard of the outboard edge of the epoxy.
(2) Trim all masking tape as necessary to allow a continuous band around the boot and the outboard edge of the restrainer strap.
(3) Use a 3/4 inch brush to apply the enamel sealant around the edges of the boot, the entire restrainer strap, the nylon cable tie, and to the fine line tape at the blade shank.
(4) Application of Sealer
(a) Mixing of Materials. Mix two parts of Sunbrite 78-U-1003 or 78A-1003 brushable black enamel with one part enamel catalyst U-1001-C.

CAUTION: It is imperative that the masking steps, as described in the previous steps be followed. This will make sure that the sealer will be applied to both the adhesive and 0.125 inch of the propeller blade. If the adhesion line and the sealer line start at the same point water will be allowed to seep underneath the adhesion line, resulting in an ineffective seal.

(b) Applying Sealer. Apply one, even, brush coat of sealer to the area around the boot covering the 0.125 inch (3.18 mm) of propeller blade and adhesive as described above along with a masked off area of 0.125 inch of the deice boot itself. Remove masking tape as sealer is brushed on, otherwise, sealer will pull up along with the tape. Allow sealer to dry. (Refer to Figure 202)
(5) Immediately remove all masking tape including the fine line tape.
(6) Make sure there is at least 0.125 inch (3.18 mm) of bare metal exposed on the inboard end of the propeller blade leading edge guard. Failure to leave the inboard end of the leading edge guard bare metal will decrease the ability of the propeller blade to dissipate electricity in the event of a lightning strike on the propeller blade.

(7) Allow the sealant enamel to dry for at least one hour at 65 to 75°F (18 to 24°C) before you handle the boot and strap area, at least 12 hours before starting engine, and 24 hours before operating the deice boots.

L. Final Electrical Check

(1) Check the electrical resistance between the boot leads. Refer to Table 202, Deice Boot Resistance Values for the resistance values of the boot installed.

(2) Check for intermittent open circuits by tensioning the deice boot leads and/or strap slightly while measuring resistance. Also, press lightly on the entire deice boot heating element surface and in the area adjacent to leads. Resistance must not fluctuate. This check is important because an intermittent open circuit may not show up until the propeller is rotating.

7. Lead Strap Installation

A. Installing Lead Straps (Integral Lead Type Boot)

(1) Route lead straps taking care not to twist the strap. The lead straps should be clamped to the spinner bulkhead with clamps provided. All excess strap length should fall between this clamp and the deice boot. A rubber grommet is to be used when routing the strap through the spinner bulkhead. Attach leads to the corresponding slip ring studs with nuts and washers provided.

NOTE: Leads for the lead straps are marked for attachment to the slip ring studs. Refer to the airplane service or maintenance manual for instructions to attach the deice boot lead straps to the slip ring assembly.

(2) After installation of the lead straps is complete, make sure that the length is sufficient so as not to be placed in tension when the propeller is moved through full pitch range.

CAUTION: Do not run engines with spinner dome removed; damage will result to the wiring harnesses or lead straps due to the centrifugal force.

PROPELLER REMOVAL/INSTALLATION

1. Ground Support Equipment

A. The following special equipment is may be required for field maintenance of McCauley propellers.

NAME	PART NUMBER	MANUFACTURER	USE
Propeller Stand		Commercially available	To hold propeller for storage or in preparation to install on airplane.

2. Uncrating and Acceptance Checking a New Propeller

A. Uncrating the propeller.
   (1) Place the crated propeller in an area that has good lighting and where there is sufficient room to remove the crating and packaging material with the propeller laying flat against the floor or table top of sufficient size to support the propeller (with the propeller mounting flange facing down).
   (2) Inspect the exterior of the crated propeller for signs of damage. If there are any signs of damage, make sure the propeller is thoroughly inspected in the area of the observed crate damage after it has been removed from the packaging material.
   (3) Remove the crate and packaging material.

NOTE: McCauley uses a variety of shipping containers and materials. For three blade propellers, the crating material is almost always corrugated cardboard, with the box in the shape of a rectangle or a "Y".

   (4) After the propeller is free of the crate and packaging material, place the propeller on a propeller stand of sufficient size to safely hold the propeller.

CAUTION: Never store or stand a propeller on a propeller blade tip. Damage to the propeller may occur if it is not properly handled after it has been removed from the shipping container.

B. Acceptance Check
   (1) Do a visual inspection of the propeller blades and hub for surface damage such as dents, nicks, scratches, and hub corrosion. Sight down the edges of each propeller blade to make sure there is no damage.

NOTE: It is possible for a propeller to sustain shipping damage while crated and for the shipping container to not sustain substantial damage as a result of the shipping damage.

   (2) Retain the installation parts that are shipped with the propeller for use when the propeller is to be installed.

NOTE: If the propeller has been shipped with one or more of the propeller blades removed from the hub, the propeller must be reassembled by an FAA approved Part 145 Propeller Repair Station or international equivalent.

3. Propeller Removal and Installation

A. General

(1) Propeller removal and installation shall be performed only by qualified maintenance personnel. The following instructions are general in nature. The aircraft maintenance manual or STC installation instructions should always be consulted for any specialized procedures applicable to a specific aircraft. Various spinner and deice arrangements not manufactured by McCauley may be used which require additional procedures.

NOTE: Qualified maintenance personnel means the person doing the maintenance activity is the holder of, or is working under the direct supervision of, the holder of the appropriate rating to approve the propeller for return to service after the maintenance activity has been accomplished.

(2) In the following instructions, installation of the propeller is based on the assumption that a McCauley spinner will be used. If a spinner is not used or if the spinner is not manufactured by McCauley, omit those steps which apply to the spinner.

WARNING: Verify that engine magnetos have been grounded prior to approaching the propeller.

B. Spinner Assembly Removal

CAUTION: Make sure you do not damage or scratch the blades when removing the spinner shell.

(1) For all propeller installations:
(a) Make an alignment mark on the spinner shell, spinner aft bulkhead and the No. 1 propeller blade with a felt tip pen. This index mark ensures accurate restoration of spinner shell position to lessen the distortion of any dynamic balance previously performed on the propeller assembly.

NOTE: The propeller blade number will be stamped on the forward side of each propeller hub blade socket.

(b) Remove screws and washers from the spinner and fillet assemblies (Refer to Figure 401).
(c) Remove spinner from the bulkhead and fillet assemblies.
(d) Remove the spinner support and shims from the front of the propeller cylinder.
(e) If required, remove screws and washers attaching spinner fillets to bulkhead and remove the fillets. Identify location of each fillet to the bulkhead.
1 For propellers equipped with an anti-ice system (anti-ice fluid shoes)
a Remove clamp securing hose to each fillet assembly (refer to the Anti-Ice section of this manual for additional removal instructions).
b Remove each fillet assembly from the hose.

C. Propeller Assembly Removal
(1) Remove cowling as required for access to mounting nuts.
(2) If required, remove the deice leads.
(3) Place a drip pan under the propeller mounting surface to catch any spilled engine oil when the propeller is removed.
(4) Break the torque on the propeller mounting nuts on Continental engine installations.
(5) Lift the Propeller
(a) Install the propeller sling and attach to a hoist. If a hoist is not available, the propeller may be supported and lifted by hand.

NOTE: Make sure an adequate number of people are available to adequately support the propeller if a hoist is not used.

(b) The straps of the propeller sling should be placed on two of the propeller blades at least 6 inches (152 mm) outboard of the propeller hub. Make sure you protect the deice boots or anti-ice shoes from potential propeller sling abrasion damage, if installed.

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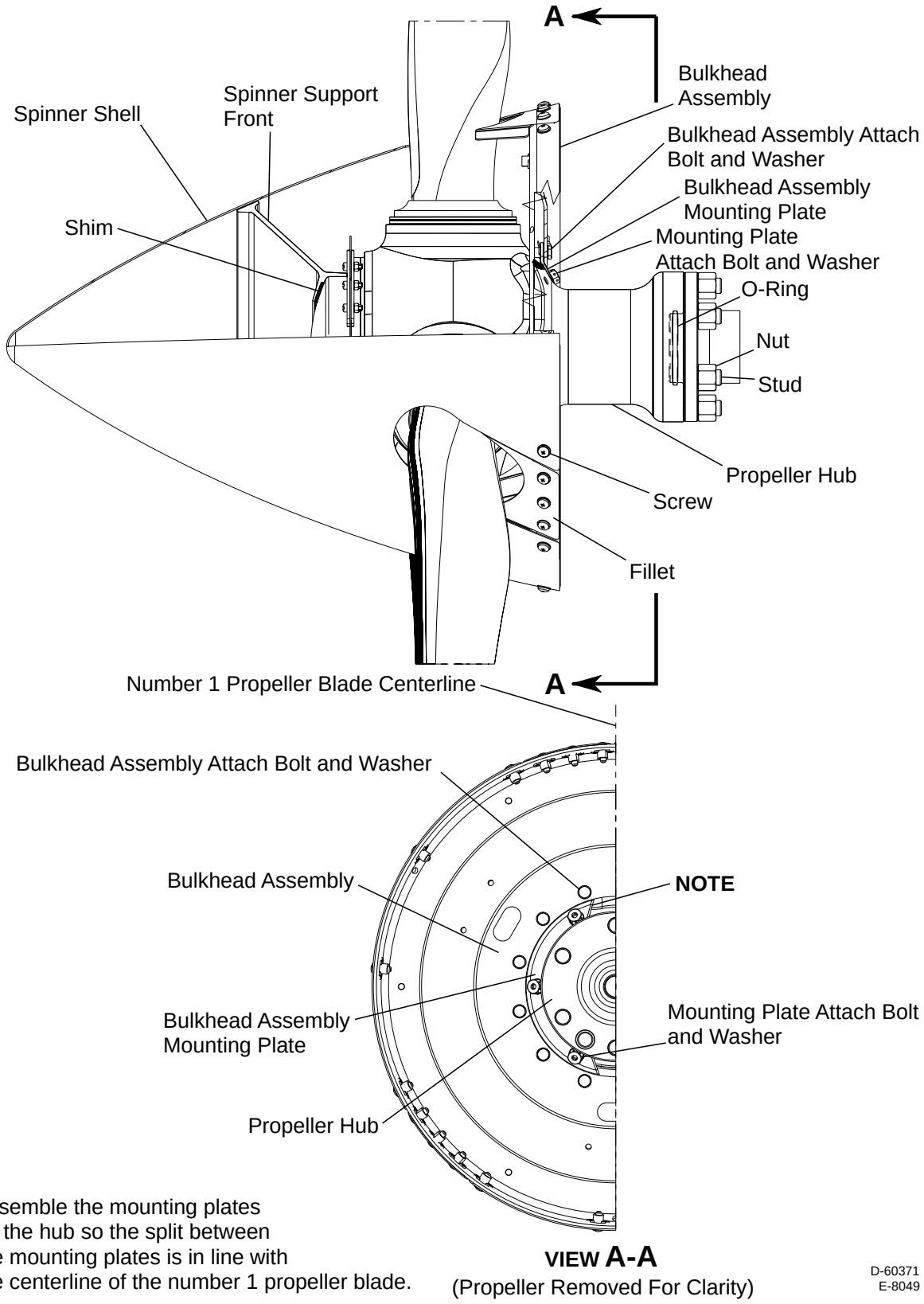

NOTE: Assemble the mounting plates on the hub so the split between the mounting plates is in line with the centerline of the number 1 propeller blade.

VIEW A-A
(Propeller Removed For Clarity)

D-60371
E-8049

Propeller Spinner Installation
Figure 401 (Sheet 1)

(c) The sling and hoist should have a weight limit rating at least twice the weight of the propeller that is to be removed.
(d) Take up slack on the propeller sling and hoist, or support the propeller by hand, and remove the propeller mounting nuts.

CAUTION: Propeller must be removed from the engine in a straight motion. Any rocking of the propeller on the engine could cause damage to the propeller mounting flange.

(e) Carefully slide the propeller forward and remove from the engine.
(f) Place the propeller on a suitable support or propeller stand.
1 Do not let the propeller be supported by the tips of the propeller blades or "stand" the propeller on the propeller blade tips.
2 The stand should be able to hold the propeller securely and have a weight limit rating at least twice that of the removed propeller.
3 Make sure the propeller is protected from damage while in the stand. All areas of the stand that come in contact with the propeller should be padded sufficiently to prevent abrasion damage to the propeller.

(6) Install a protective cover over the propeller hub mounting flange.
(7) Install a protective cover over the open end of the engine propeller flange.

D. Propeller Assembly Installation

NOTE: McCauley recommends that propeller mounting nuts (if applicable) be replaced at each propeller installation, whenever possible. However, nuts may be reused providing threads are in good condition and the locking material prevents turning of the nut on the stud by hand.

(1) If required, attach bulkhead mounting ring or bulkhead to hub. Make sure the (felt tip pen) alignment marks between the bulkhead and the propeller blade are in alignment.
(2) Remove the protective cover from the end of the engine propeller flange.
(3) Ensure that engine propeller flange, hub mounting flange, dowels and holes, mounting studs and holes are clean, dry, and free of damage and foreign material.
(4) Remove protective cover from the propeller hub mounting flange.
(5) Ensure that a new McCauley O-ring (A-1633-3 O-ring for airplanes with Continental engine installations) is installed in the groove of the propeller hub mounting flange. Lubricate the O-ring with engine oil prior to installation of propeller.

NOTE: In the past, new propeller assemblies shipped from McCauley, the propeller hub/engine O-ring was installed in the O-ring groove of new propellers and hub assemblies. This practice has been discontinued. The O-ring is now included in the propeller unattached parts kit, which is included in the box with the propeller or hub assembly. Install the O-ring according to the assembly instructions in this Owner/Operator Manual.

(6) Install the propeller sling and attach to a hoist. If a hoist is not available, the propeller may be supported and lifted by hand.

NOTE: Make sure an adequate number of people are available to support the propeller if a hoist is not used.

(a) The straps of the propeller sling should be placed on two of the propeller blades at least 6 inches (152 mm) outboard of the propeller hub. Make sure you protect the deice boots or anti-ice shoes from potential propeller sling abrasion damage, if installed.
(b) The sling and hoist should have a weight limit rating at least twice the weight of the propeller that is to be installed.

(7) Position the propeller close to the engine propeller flange and align the dowel pins with the dowel pin holes if applicable.

CAUTION: Propeller must be installed straight onto engine flange. Any rocking of propeller relative to the mounting flange could result in damage to engine/propeller flange mating surfaces.

(8) Mount the propeller on the engine crankshaft. Make sure the index marks made with a felt tip pen align between the aft spinner bulkhead and the applicable propeller blade.
(a) For E-8116 spinner installations, install the aft spinner bulkhead between the propeller hub and the engine mounting flange.

NOTE: Make sure the bulkhead assembly is positioned correctly to permit the installation of the fillet assemblies aft and inline with each propeller blade.

(9) Ensure the threads of nuts and studs are free of burrs, nicks, and similar damage, make sure the threads are clean of all foreign material.
(a) For Continental engine installations:

WARNING: If the lubricant is not applied as required, the nuts will be under torqued, and the propeller could fail.

CAUTION: Do not use oil as a substitute for approved lubricant. It is imperative that the correct specification of lubricant be used during installation. Substitution of the approved grease with an unapproved lubricant (or no lubricant) could result in under-torquing or severe over-torquing of propeller attaching parts.

1 Lubricate the threads of studs and nuts and the faces of nuts, spacers, or washers with MIL-PRF-83483 (McCauley part number A-1637-16) grease.
2 Install mounting nuts on mounting studs.
a Make sure the nut locking material prevents the turning of the nut (past the nut fiber locking material) on the stud by hand.
3 Torque the mounting nuts in an alternating sequence to prevent the hub rocking on the engine flange.
4 When the hub is seated fully on the engine flange, torque to the specification called out in the mounting decal located on propeller hub at the number 1 socket.

NOTE: If the decal containing the propeller installation instructions is missing or illegible, install a new decal. For Continental engine installations use part number A-2230-9 decal.

a The A-2230-9 decal specifies a lubricated torque (MIL-T-83483 grease) of 45 to 50 foot-pounds (61.0 to 67.8 N-m).
5 After you apply the final torque, apply torque seal to nut and stud threads.
(b) If required, install the deice leads.

(10) If an adaptor or extension is attached to the torque wrench drive end and this adds to its length, then the actual applied torque will be greater than the dial reading. The following formula should be used to find what the dial should read in order to obtain the correct applied torque:

$$\frac{\text{(actual torque required) x (torque wrench length)}}{\text{(torque wrench length) + (length of the adapter)}} = \text{Torque Wrench Reading to Achieve the Required Actual Torque}$$

E. Spinner Installation (if applicable)

CAUTION: Under-shimming or over-shimming of the spinner front support could result in spinner wobble, vibration, and/or bulkhead and spinner cracking. Follow shimming procedures carefully.

(1) If the aft spinner bulkhead and the bulkhead mounting plate were removed from the propeller assembly, install the mounting plates and aft spinner bulkhead onto the propeller.

NOTE: Bulkhead mounting plates are used on spinner assemblies that do not have an aft bulkhead that is installed between the engine crankshaft and the propeller mounting flange.

(a) Install the mounting plates onto the propeller assembly with the split between the plates in-line with the No. 1 propeller blade.
(b) Torque bolts 72 to 84 Inch Pounds (8.13 to 9.49 N-m).
(c) Secure the bolts with lockwire in sets of three.
(d) Install the bulkhead assembly onto the mounting plates.

NOTE: Make sure the bulkhead assembly is positioned correctly to permit the installation of the fillet assemblies aft of the propeller blades.

(e) Torque bolts 30 to 36 Inch Pounds (3.39 to 4.07 N-m).

(2) If required, install propeller spinner fillets on the bulkhead with screws and washers.
(a) For propellers equipped with an anti-ice system (anti-ice fluid shoes), refer to the Anti-Ice section of this manual, for additional installation instructions).

(3) Insert the same number of shims into spinner support as were removed, and lightly press the spinner support onto propeller cylinder. Make sure the index marks made with a felt tip pen align between the spinner and the propeller blade.

(4) Put the spinner shell onto the bulkhead and fillet assembly with the alignment marks matched.
(a) Press firmly aft on the spinner.
(b) Make sure the spinner holes are approximately one-half hole diameter forward of the matching holes in the bulkhead.
(c) Add or subtract shims to spinner support until spinner shell mounting holes are approximately half a hole from being in true alignment with bulkhead holes.

(5) Push on the spinner shell and use an awl or a small punch in an adjacent hole to move the spinner shell screw hole into alignment with bulkhead hole and install washer and screw. Repeat this procedure on opposing holes until eight evenly spaced screws and washers are installed.

(6) Secure propeller spinner to the bulkhead and fillet assemblies with remaining screws and washers.

F. Operational Check of Installed Propeller

(1) Refer to the applicable airplane Pilot's Operating Handbook, Preflight Inspection and Before Takeoff (engine running) Propeller Control check of the propeller cycling from high RPM to low RPM and back to high RPM. This is a sufficient operational check of the installed propeller.

PROPELLER ADJUSTMENT/TEST

1. Static Balance

A. Checking and adjusting the propeller static balance shall be accomplished by an FAA approved Part 145 Propeller Repair Station or international equivalent.

2. Propeller Pressure Leakage Check Requirements

A. Propeller pressure leakage tests of the cylinder and the hub shall be accomplished by an FAA approved Part 145 Propeller Repair Station or international equivalent.

3. Dynamic Balance

NOTE: Some aircraft manufacturers do not approve dynamic balance of the propeller because of potential crack damage to spinner bulkhead from the installed weight.

A. Refer to Propeller Maintenance Practices, Dynamic Balance for instructions to dynamically balance the installed propeller.

PROPELLER INSPECTION/CHECK

1. Limitations

A. Operational and service personnel should be familiar with the following limitations during any inspection.

B. Corrosion. Other than small areas of light surface corrosion with no evidence of pitting, the presence of corrosion may require propeller removal and reconditioning by an appropriately rated repair facility. Intergranular corrosion may be present when the corrosion protective coatings (paint, anodize coating, etc.) have been lost. Corrosion pitting should be removed as described in the overhaul manual by an FAA approved Part 145 Propeller Repair Station or international equivalent.

C. Blade Shortening.
   (1) Propeller tip damage will sometimes lead field maintenance personnel to consider removing damaged material from the blade tips. However, propellers are certified to the aircraft engine and airframe resonant frequency by being manufactured with a particular diameter to minimize vibration. Shortening of the blades without reference to approved data could create an unairworthy condition. Refer to the airplane type certificate data sheet, aircraft specification sheet, or supplemental type certificate data sheet as applicable, for the allowable propeller diameter for each propeller installation.
   (2) With certain limitations, specific minor repairs may be accomplished.
      (a) If the blade tip has been damaged and the removal of the damaged area would result in shortening of the propeller blade(s), the propeller shall be taken to an FAA approved Part 145 Propeller Repair Station or international equivalent by personnel trained to overhaul McCauley composite propellers for propeller blade repair.
      (b) When conditions indicate, inspect the blade tips for evidence of shortening and, if necessary, measure the propeller diameter to determine if an unauthorized repair has altered it.

2. Definitions of Defects and Damage

A. Brinelling is the occurrence of shallow, spherical depressions in a surface, usually produced by a part having a small radius in contact with the surface under high load.

B. A Burr is a small, thin section of metal which extends beyond the edge of a regular surface and usually is located on a corner of, or on the edge of, a bore or hole.

C. BVID - Barely Visible Impact Damage, impact damage that is barely visually detectable without the use of a magnifying glass.

D. Corrosion is the loss of surface metal by a chemical or electrochemical action, and the resulting product (for example, iron rust) usually can be removed mechanically.

E. A Crack is an irregularly shaped separation within a material at a location of excessive stress and usually is visible as a thin line across the surface of the material.

F. A Cut is a mechanical loss of material (e.g., by saw blade, chisel, or glancing blow of a sharp-edge stone), usually extending to a significant depth over a relatively long, narrow area.

G. Delamination is the failure of the bond between laminate layers, this failure can be caused by matrix breakdown, repeated cyclic stress, or impact damage.

H. A Dent is a depression in a material surface caused by an object striking the surface with force.

NOTE: The surface around the dent usually will be sightly deformed.

I. Distortion or Bending is the alteration of a component's original size or shape.

J. Erosion is the gradual wearing away or deterioration of a material due to action of the elements.

K. Exposure is leaving a material open to action of the elements.

L. Fretting is the occurrence of shallow, spherical surface depressions, usually caused by vibratory ("chattering") action or by a part which has a small radius in contact under high load with the material.

M. Galling (or burnishing) is the breakdown (or buildup) of a material surface resulting from excessive friction between two moving parts.

NOTE: Particles of the softer material will tear loose (breakdown) and weld to the surface of the harder material (buildup).

N. A Gouge is a small surface area where material has been removed by contact with a sharp object.

O. Impact damage occurs either in-flight or on the ground when a propeller blade or hub assembly strikes or is struck by an object.

P. An Inclusion is the presence of an unspecified material that was introduced into a portion of stock material during manufacturing processes such as rolling, forging, or molding.

Q. A Nick is a localized break or edge notch, usually with displacement of (rather than loss of) material.

R. Pitting is seen as a number of extremely small (possibly deep) gouges, usually with defined edges, caused by wear and/or deterioration on the surface of a material.

S. A Score is deeper than a Gouge and may show discoloration from the temperature produced by friction from contact under pressure.

T. A scrape is a localized break or edge notch, usually with the loss of material that is the result of multiple impacts.

U. A Scratch is an elongated Gouge.

V. A Stain is a localized color change noticeably different from the surrounding surface area. Stains can be caused by foreign object deposits (usually benign) to chemical changes in the material caused by chemical contact or burn/heat damage (not benign).

3. Daily or Preflight Inspection

A. Blade Visual Inspection
(1) Wash the blades with a mild soap and water solution to remove all residue. Refer to Propeller Maintenance Practices for propeller cleaning procedures.
(2) Surface Damage.
(a) Look for surface damage on both sides of the blades such as gouges, nicks, scratches, and delamination.
(b) Surface imperfections can also be felt by running your fingernail along the blade surface.
(c) A mechanic should make sure any area of raised material damage is cosmetic and does not extend into the carbon fiber of the propeller. Refer to Table 603, Propeller Nick and Scrape Limits for damage limits.
(3) Erosion
(a) Examine the blade for evidence of erosion.
1 If blades appear to show erosion extending into the fiberglass material, the propeller should be removed from service and evaluated by an appropriately rated propeller repair facility.
(b) Examine the condition of the paint on the propeller blades and the spinner, if painted.
1 Paint helps prevent erosion of the propeller blade surface. Refer to Propeller Blade Damage Assessment and Disposition for paint wear assessment information.
2 Do not apply excessive paint and do not paint propeller components unless it is in accordance with McCauley instructions.

NOTE: Excessive paint thickness can cause damage to the propeller as a result of a lightning strike and may affect propeller balance.

(4) Straightness
(a) Sight down the edges of each of the propeller blades for signs of deformation.
(5) Looseness

(a) Feel the blades and move them to find unusual changes in looseness and unusual play.
1 Blade-to-blade differences indicate that an internal problem may exist.

(6) Any indications of damage that is greater than the limits in provided Table 603, Propeller Nick and Scrape Limits, will require the propeller to be reexamined by an FAA approved propeller repair station or international equivalent.

B. Spinner and Bulkhead.
(1) Externally examine the spinner and bulkhead for security, missing fasteners, damage, and cracks. Cracks typically start from the screws that attach the spinner to the bulkhead.
(a) Repair of cracks in the spinner or spinner bulkhead is not permitted.
(2) Check for looseness of the aft spinner bulkhead. A loose bulkhead could be an indication that the propeller mounting bolts are loose.
(3) Wear depth on the inside of the spinner must not exceed 0.010 inch (0.25 mm).

NOTE: Wear inside the spinner can be caused by improper shimming of the spinner or by deice leads rubbing.

C. Oil and Grease Leakage.
(1) Look for red oil or engine lubricant leaks in unusual places, such as the outside surfaces and seals.
(2) Oil or grease leakage may be due to a seal failure or a crack in the hub or blade.
(a) The source of the oil or grease leak should be determined before flight.
(b) During maintenance, wipe the surfaces of the propeller after this inspection, not before, since oil leaking from a crack may assist in detecting it.
(c) Red oil gives a positive warning of a crack in the hub or a damaged seal.
(3) If there is an indication of a crack in the propeller hub, the propeller must be examined by an FAA approved propeller repair station or international equivalent before propeller operation.

D. Control System.
(1) The control system (governor) should be checked to determine if the system is operating properly. Make sure there are no oil leaks from the governor.

E. Maintenance Records.
(1) Note any indications of propeller wear or damage in the propeller logbook for future reference to determine whether an observed condition is getting worse.

4. 100 Hour and Annual Inspection

A. At each 100 hours, Annual, or other required inspection interval, examine the propeller in accordance with the applicable inspection in the aircraft maintenance manual. The inspection should include:
(1) Remove the spinner.
(2) Inspection of all attaching hardware, including the hardware under the spinner, for security. Tighten if necessary.
(3) Check entire propeller assembly for corrosion, cracks, delamination or other damage. .
(a) Repair any damage found in accordance with the instructions in the Propeller Approved Repairs and/or the Cleaning/Painting/Protective Treatments sections of this manual.
(b) For propeller assembly damage that cannot be repaired in accordance with the instructions in this manual, take the propeller assembly to an FAA approved Part 145 Propeller Repair Station or international equivalent for repair.
(4) Touch-up the paint on the propeller blades, as necessary, in accordance with the instructions in Cleaning/Painting/Protective Treatments.
(5) Examine all placards for legibility and security of installation. Replace all placards that are illegible or not secure.
(6) Inspect entire propeller system for oil leakage. If leakage is confirmed, the propeller should be removed, thoroughly inspected, and resealed by an FAA approved Part 145 Propeller Repair Station or international equivalent or technician.
(7) The propeller mounting bolt torque should be checked at least once a year.
(8) Deice boots (if installed)

(a) Closely check each deice boot for wrinkled, loose, or torn areas, particularly around the outboard edges. Look for abrasion or cuts, especially along the leading edge and the face or flat side of each propeller blade.
1 Foreign object damage must be given careful inspection, not just for damage to the deice boot, but also for blade damage beneath the boot. Boot elasticity may obscure blade damage. If the deice boot is damaged or cut completely through to the blade or if blade damage beneath a boot is suspected, the the boot must be removed for blade surface inspection in the area of the deice boot damage.

(9) Anti-Ice Equipment (if installed)
(a) For propellers equipped with McCauley installed anti-ice equipment, refer to Anti-Ice System - Inspection/Check.

5. Time Between Propeller Overhaul

A. The following is McCauley's mandatory specified time between overhaul for propellers. These specifications are based on hours of operation and calendar time, whichever occurs first. The starting point for the calendar limit is the date of first installation on an engine (not from date of manufacture or overhaul). Date of manufacture or overhaul is applicable when determining long term storage inspections. If the propeller has been removed from service, the TBO calendar limit still applies from the date the propeller was first put into service, once a propeller has been placed into service, long term storage will not have an affect on the TBO calendar limit.

NOTE: Calendar month is the period of time from the first day of a month to the last day of the month. When the term calendar month is used, compliance can be achieved at any time during the month, up to and including the last day of the month. For Example: a propeller with a 60 calendar month inspection interval is inspected and approved upon any given day of the month. This propeller will become due for inspection upon the last day of the same month, 60 months later.

B. All deviations from published TBOs must be approved by your local Regulatory Authority with a recommendation from McCauley.

C. If the propeller is in storage in excess of three years, additional inspections are required. Once installed on an aircraft, the propeller calendar limit is not interrupted by subsequent removal and/or storage.

D. Propeller overhaul should, as much as practical, coincide with engine overhaul. For example, in a case where propeller TBO is 2,000 hours and engine TBO is 1800 hours, the propeller should be overhauled at the same time as the engine. This is appropriate as long as neither TBO limit is exceeded.

CAUTION: Review applicable FAA Airworthiness Directives or McCauley Service Bulletins. These may require compliance prior to TBO.

E. TBO specifications are based on normal aircraft with normal and continuous usage. Flight time and calendar limit must not be the only factors considered in determining when a propeller needs to be overhauled. Factors such as operating conditions or environment often demand that a propeller, governor, or accumulator be overhauled prior to TBO. Even though a propeller, governor, or accumulator may be operating normally and have a good external appearance when the TBO flight time or calendar limit is reached, operation beyond the specified TBO limits is not permitted.

F. Propeller Models
(1) The propeller model designation is impression stamped on the propeller hub. Change letters are frequently stamped at the end of the model designation (e.g. D3A37C3401-A). These letters indicate engineering changes and/or previous overhaul modifications. In Table 1, unless specific change letters are shown, the overhaul frequency note applies to all propellers of that model, regardless of change letters. Use the highest letter stamped after the hub model number to determine frequency of overhaul. Refer to Tale 601.

Table 601. Table 1: Propeller Models

Model Designation	Overhaul Frequency Note	Model Designation	Overhaul Frequency Note	Model Designation	Overhaul Frequency Note
D3A37C3401	A.				

NOTE

A. *2400 hours or 72 calendar months,* whichever occurs first.

6. Necessary Actions Following Object Strike of Stationary Propeller, Blade Strike of Rotating Propeller, Bird Strike, or Sudden Engine Stoppage

A. Object Strike of Stationary Propeller

(1) "Object Strike" is defined as any impact of a non-rotating propeller by a substantial moving object, such as any personnel vehicle, aircraft tug, ground power unit, etc.

NOTE: The definition is intended for use as an example only. Determination as to whether or not an object strike actually occurred is ultimately the responsibility of the aircraft operator.

(2) Inspect the propeller blades for damage such as scrapes, gouges, cracks, crushed areas, etc. caused by the impact. Any damage that is beyond normal operation limits is cause for propeller removal and repair.

(3) Check blade twist. All blades in a propeller should have the same amount of "rotational play". If the difference in rotational play between two blades is beyond 1.0 degree, uneven internal wear or damage is the possible cause.

(a) For example, rotational movement of No. 1 blade measures 1.2 degrees and No. 2 blade measures 2.3 degrees. This would be considered excessive since the difference is more than 1.0 degree. This check must be performed every 10 hours for the next 20 hours. If no change is seen after 20 hours, inspections may be discontinued.

NOTE: The results of an object strike inspection should be noted in the propeller log book and, if required, note when the next inspection is due.

(4) If any propeller blade is damaged beyond field repair limits, take the propeller assembly to an FAA approved Part 145 Propeller Repair Station or international equivalent for repair.

B. Blade Strike of Rotating Propeller

(1) "Blade Strike", sometimes referred to as "Ground Strike", is defined as any impact or suspected impact of the rotating propeller upon such items as, but not limited to, the ground, tow bars, landing lights, carts, snow banks, hedges, etc. Please note that the above definition is intended for use as an example only. Determination as to whether or not a blade strike actually occurred is ultimately the responsibility of the aircraft operator.

CAUTION: Internal damage can occur without evidence of gross external damage.

(a) Any McCauley propeller experiencing a blade strike must be removed from the aircraft and overhauled by an approved McCauley composite propeller overhaul facility in accordance with the applicable overhaul manual.

(2) Bird Strike

(a) "Bird Strike" can be defined as the impact of any bird into the rotating propeller causing damage.

(b) Inspect all blades for damage such as scrapes, gouges, etc. caused by the impact. Any damage beyond normal limits is cause for propeller removal and repair.
(c) Check the blade track and verify that all blades measure within the following limits:
1 0.060 inch (1.52 mm) of each other on piston engine propellers.
(d) Check blade twist. All blades in a propeller should have the same amount of "rotational play". If the difference in rotational play between two blades is beyond 1.0 degree, uneven internal wear or damage is the possible cause.
1 For example; rotational movement of No. 1 blade measures 1.2 degrees and No. 2 blade measures 2.3 degrees. This would be considered excessive since the difference is more than 1.0 degree.
2 This check must be performed every 10 hours for the next 20 hours after a bird strike. If no change is seen after 20 hours, inspections may be discontinued.

NOTE: The results of a bird strike inspection should be noted in the propeller log book and, if required, note when the next inspection is due.

(e) For a propeller that is found to be damaged beyond the normal limits, the propeller must be removed from the aircraft and overhauled by an FAA approved Part 145 Propeller Repair Station or international equivalent by personnel trained to overhaul McCauley composite propellers.

(3) Sudden Engine Stoppage
(a) "Sudden Stoppage" is defined as any propeller experiencing a sudden decrease in RPM. This is commonly due to engine failure or seizure. Please note, determination as to whether or not sudden engine stoppage has occurred is ultimately the responsibility of the aircraft operator. McCauley recommends consulting the engine manufacturer's data to determine criteria for sudden engine stoppage.
(b) Any McCauley propeller experiencing a sudden stoppage must be removed from the aircraft and completely overhauled by an FAA approved Part 145 Propeller Repair Station or international equivalent by personnel trained to overhaul McCauley composite propellers.

7. Blade Track Check

A. Check
(1) Turn propeller so that Number 1 blade is straight down.
(2) Position a smooth board beneath the blade tip.
(3) Block up the board firmly in place just clear of the blade tip.
(4) Place a pencil mark approximately one inch (25 mm) long on the board at the midpoint of the outer edge of Number 1 blade tip.

NOTE: Make sure the normal propeller blade shake movement does not affect the results of this test. Do not push or pull the blade while making a the pencil mark.

(5) Turn the propeller so next blade is straight down.
(6) Place a thin one-inch (25 mm) line on the board at the midpoint of the outer edge of the second blade tip.
(7) Carefully turn propeller, and repeat tracking measurement for each blade.
(8) Each time a line is added, measure the horizontal difference between the lines farthest apart.
(a) For the C3400 model series propeller, all blades must measure within 0.060 inch (1.52 mm) of each other.
(9) If blade track difference exceeds the allowable limits, remove the propeller and have the propeller face alignment checked by an FAA approved Part 145 Propeller Repair Station or international equivalent.

NOTE: A bent engine crankshaft or unauthorized propeller blade repairs can cause the propeller blade track to be beyond the allowable limits.

8. Lightning Strike Inspection Requirements

A. If doubt exists as to the occurrence of a lightning strike, the following criteria can be used to verify any suspicion of a lightning strike:
(1) Check for burns or signs of arcing on the blades, hub, and spinner.
(2) Using a magnetism detector, check all exposed steel areas of propeller for magnetism. A positive magnetic indication suggests the propeller was struck by lightening.

NOTE: Any accepted industry standard magnetic detection device is permitted to be used to test for magnetism in the exposed steel parts of the propeller.

(3) Look for any signs of localized melting or metal flow, particularly on the propeller blades.
(a) Check the leading edge guard of each propeller blade for discoloration or disbond.
(4) Examine all areas of missing paint for signs of a lightning strike.
(5) If preliminary inspection suggests an actual strike, a complete propeller overhaul is to be accomplished in accordance with the applicable McCauley overhaul manual by an FAA approved Part 145 Propeller Repair Station or international equivalent by personnel trained to overhaul McCauley composite propellers.

9. Propeller Overspeed Inspection Requirements

A. The following are inspection criteria for McCauley propellers involved in an overspeed condition.

	Percentage Overspeed	**Action to be Taken**
All C3400 Model Series Propellers	Up to, and including 10% (110% actual)	General external visual inspection. No further action required.
	More than 10% (more than 110% actual)	Contact McCauley Product Support for disposition.

10. Normal Criteria for Static Blade Shake and Twist of Variable Pitch Propellers

A. Blade Shake
(1) Blade shake is defined as follows:
(2) The tendency for the propeller blades to wobble slightly when the tip is physically moved by hand, lead edge to trail edge, (Refer to Figure 601) is known as blade shake.
(a) This tendency is a natural result of the fabrication of parts within the McCauley retention system. While accumulation of tolerances is measured in thousandths of an inch, it must be remembered that both the parts causing blade shake, and the pivot point about which the blade rotates, are near the blade root. As a result, very small differences at the blade root will be magnified many times when measured at the tip.
(3) Normal blade shake is no cause for concern, as it disappears during propeller rotation due to the high centrifugal forces acting on the blades (15,000 to 20,000 pounds. (66,723 to 89,000 N)).

NOTE: The McCauley C3400 series propellers do not require a blade shake check. The unique features of the composite blade and the Spring - Anti Blade Shake results in a propeller blade installation that does not require a blade shake check.

B. Blade Twist
(1) Two Categories of Blade Twist exist. They are defined as follows:
(2) Rotational play is defined as the sum total of rotational movement a propeller blade allows when moved by hand around its axis of rotation (Refer to Figure 601).
(a) This movement is, to a limited degree, considered normal and should not be cause for concern. All blades in a propeller should have about the same amount of rotational play.
(b) If the difference in rotational play between two blades is beyond 1.0 degree, uneven internal wear and/or damage is the possible cause.

EXAMPLE: Rotational movement of No. 1 blade measures 1.2 degrees, and No. 2 blade measures 2.3 degrees. This would be considered excessive since the difference between blade No. 1 and Blade No. 2 is greater than 1.0 degree.

(c) The cause of the excessive difference must be determined by an FAA approved Part 145 Propeller Repair Station or international equivalent.

(3) Blade angle split is a measurement of the angle differences between all the blades in the same propeller. This value is much more critical than rotational play described above, as a high blade angle split may indicate internal problems. While such angle split is very rare, the operator may want to measure it if a problem is suspected, most notably by a marked increase in propeller vibration levels. Blade angle split may be checked as follows:

(a) By hand, twist all of the propeller blades toward low pitch. This will eliminate any play in the propeller linkage, and reduce the possibility of a false angle reading.

(b) Using a propeller protractor at the appropriate reference station, measure the angle of each blade.

1 If measurements differ greatly (more than 0.2 degrees) between blades on the same propeller, excessive wear or damage to internal parts may exist.

2 If the blade angle split is in excess of 0.2 degrees, the propeller must be removed from service and overhauled at an FAA approved Part 145 Propeller Repair Station or international equivalent by personnel trained to overhaul McCauley composite propellers.

11. Engine Oil Contamination Inspection Requirements

A. Any propeller exposed to engine oil contamination must be removed and sent to an FAA approved Part 145 Propeller Repair Station or international equivalent for inspection. Refer to the service information of the engine manufacturer to determine if oil contamination has occurred or to determine the acceptable amount of metal particles allowed in engine oil.

12. Fire Inspection

A. Any propeller exposed to fire or excessive heat is considered unairworthy and must be removed from service and scrapped. A propeller is considered exposed to fire or excessive heat if after the suspected exposure it shows any of the following conditions:
(1) Bubbled paint.
(2) Discolored paint.
(3) Discolored metal.
(4) Melted areas.

13. Propeller Blade Damage Assessment and Disposition

A. Refer to the table that follows for the assessment of damage to the propeller blade:

Table 602. Propeller Damage Assessment and Disposition

Item No.	Condition	Disposition
(1)	Visual Inspection (propeller installed on airplane)	Pilot, operator, or aircraft mechanic assessment
(2)	Paint Wear	Pilot, operator, or aircraft mechanic assessment
(3)	Surface Nicks	Pilot, operator, or aircraft mechanic assessment
(4)	Scrapes	Initial assessment by the pilot, operator, or aircraft mechanic, may need to be evaluated at an FAA approved propeller repair station or international equivalent facility.

Table 602. Propeller Damage Assessment and Disposition (continued)

Item No.	Condition	Disposition
(5)	Cracks	Initial assessment by the pilot, operator, or aircraft mechanic, will need to be evaluated at an FAA approved propeller repair station or international equivalent facility.
(6)	Guard and Laminate Coin Tap Tests	Pilot, operator, or aircraft mechanic assessment
(7)	Delamination	Initial assessment by the pilot, operator, or aircraft mechanic, will need to be evaluated at an FAA approved propeller repair station or international equivalent facility.
(8)	Propeller tip and trailing edge damage.	Initial assessment by the pilot, operator, or aircraft mechanic, will need to be evaluated at an FAA approved propeller repair station or international equivalent facility.
(9)	Exposed Blade Core Foam	Scrap Blade/Remove Blade From Service
(10)	Notable Vibrations	Initial assessment by the pilot, operator, or aircraft mechanic, will need to be evaluated at an FAA approved propeller repair station or international equivalent facility.
(11)	Dimensional Measurements vs Limits	FAA approved propeller repair station or international equivalent facility.
(12)	Leading Edge Guard Crack(s)	FAA approved propeller repair station or international equivalent facility to replace the guard or remove the propeller blade from service.
(13)	Erosion Damage	FAA approved propeller repair station or international equivalent facility to repair the blade to serviceable condition.
(14)	Delamination in the propeller blade shank area.	FAA approved propeller repair station or international equivalent facility.
(15)	One or more carbon fiber plies of the propeller spar is damaged.	Scrap Blade/Remove Blade From Service
(16)	Burn Damage or Discoloration due to excessive heat. (Do not confuse the natural discoloration of composite materials exposed to UV radiation with heat damage.)	Scrap Blade/Remove Blade From Service

NOTE: The term "Pilot, operator, or aircraft mechanic" identifies a disposition that does not require an FAA approved propeller repair station or international equivalent facility to accomplish. If required, all FAA approved propeller repair station or international equivalent facilities can do "Pilot, operator, or aircraft mechanic" level dispositions.

B. Expanded Propeller Blade Damage Assessment and Disposition Definitions

(1) Visual Inspection. Pilot, operator, or aircraft mechanic assessment and initial inspection for cracks, scratches, nicks, missing material, or exposed fibers, unusual loft deviations/dips/waves, paint damage, raised or bubbled areas, or other visually evident damage. If a defect or damage is suspected, the propeller must be taken to an FAA approved propeller repair station or international equivalent facility for additional tests to confirm the condition of the propeller.

(2) Paint Wear.

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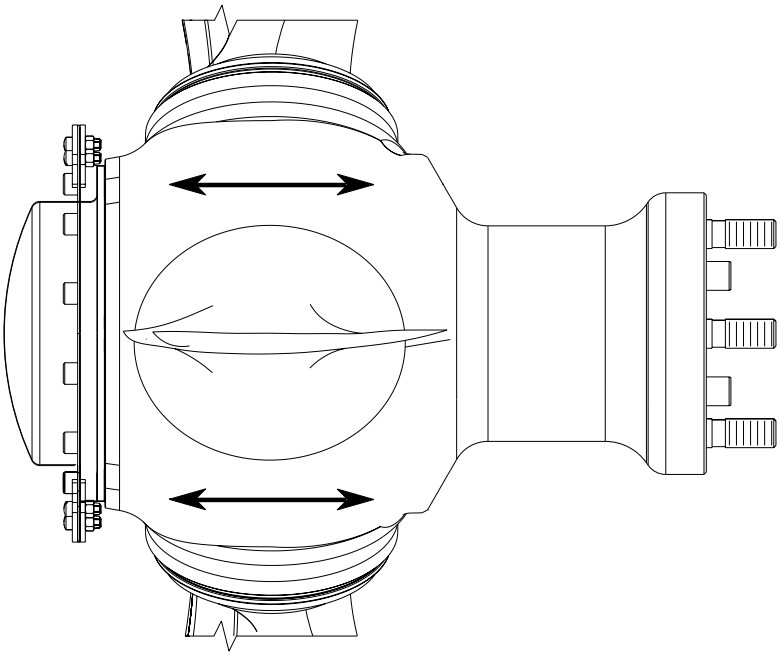
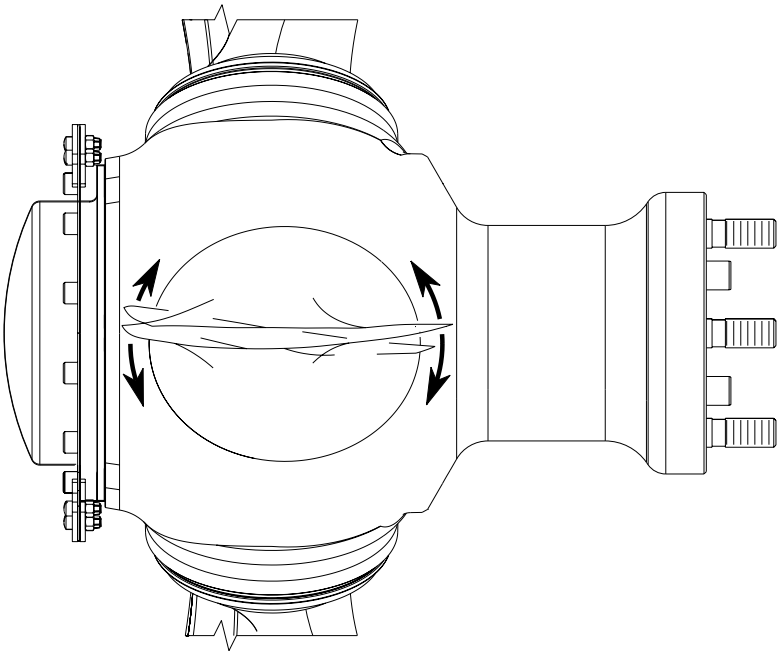
BLADE SHAKE



BLADE TWIST



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Blade Shake and Blade Twist
Figure 601 (Sheet 1)

(a) Paint wear less than 2 square inches, repair at owner's discretion, must be repaired at propeller overhaul. Refer to Exterior Surface for paint instructions.
(b) Paint wear greater than 2 square inches but less than 10 square inches, repaint affected area, cannot be deferred to propeller overhaul. Refer to Exterior Surface for paint instructions.
(c) Paint wear greater than 10 square inches, take the propeller to an FAA approved propeller repair station or international equivalent facility for inspection and paint repair. Refer to Exterior Surface for paint instructions.

(3) Nicks/Gouges in Propeller Surface.

NOTE: A Gouge is a small surface area where material has been removed by contact with a sharp object. Nicks are generally considered damage that is the result of a single point of impact damage. Refer to Table 603, Propeller Nick and Scrape Limits for additional limit information.

(a) A gouge or nick in the propeller surface that does not damage the carbon fiber (damage less than 0.020 inch (0.50 mm) deep) on the propeller blade and is less than 0.250 inch (6.35 mm) in diameter. This type of damage can be repaired using a cosmetic field repair technique and be permanently repaired at propeller overhaul using a scarf type repair.
(b) A gouge or nick in the propeller surface that contacts the underlying fiberglass fabric (damage greater than 0.005 inch (0.13 mm) deep but less than 0.020 inch (0.50 mm) deep), and greater than 0.250 inch (6.35 mm) in diameter. Propeller shall be inspected by an FAA approved propeller repair station or international equivalent facility to confirm the condition of the propeller and repair requirements. This type of damage will result in a scarf type repair of the damaged area.

Table 603. Propeller Nick and Scrape Limits

Depth of Nick, Gouge	Area of Nick or Gouge		Depth of Scrape	Area of Scrape		
	Less than 0.250 Inch Diameter	**Greater than 0.250 Inch Diameter**		**Less than 2.0 Square Inches**	**2.0 to 6.0 Square Inches**	**Greater than 6.0 Square Inches**
Less than 0.005 inch	No Action Required	No Action Required	Less than 0.005 inch	No Action Required	Paint Damaged Area	Propeller blade will require evaluation by an FAA approved propeller repair station
Between 0.005 inch and 0.020 inch and no exposed Carbon Fiber or Foam Core	Do a Cosmetic Field Repair and/or paint damaged area	Propeller blade will require evaluation by an FAA approved propeller repair station	Between 0.005 inch and 0.020 inch and no exposed Carbon Fiber or Foam Core	No Action Required	Do a Cosmetic Field Repair and/or paint damaged area	Propeller blade will require evaluation by an FAA approved propeller repair station
More than 0.020 inches or Exposed Carbon Fiber or Foam Core	Propeller blade will require evaluation by an FAA approved propeller repair station	Propeller blade will require evaluation by an FAA approved propeller repair station	More than 0.020 inches or Exposed Carbon Fiber or Foam Core	Propeller blade will require evaluation by an FAA approved propeller repair station	Propeller blade will require evaluation by an FAA approved propeller repair station	Propeller blade will require evaluation by an FAA approved propeller repair station

(4) Scrapes, initial owner assessment, may need to be evaluated at an approved McCauley composite propeller overhaul facility.

NOTE: Scrapes are generally considered damage that is the result of multiple impacts in an area that results in material being abraded and removed from the area of impact damage. Refer to Table 603, Propeller Nick and Scrape Limits for additional limit information.

(a) Scrapes that affect areas less than 2.00 square inches and do not contact the underlying fiberglass fabric and are less than 0.005 inch deep. Do the following:
1 This type of damage repair may be deferred to propeller overhaul.
2 Repair the propeller using the cosmetic surface repair technique by an approved McCauley composite propeller overhaul facility.

(b) Scrapes that affect areas greater than 2.00 square inches but less than 6.0 square inches, do not contact the underlying carbon fiber, and are greater than 0.005 inch (0.13 mm) deep but less than 0.020 inch (0.50 mm) deep). Do the following:
1 This type of damage can be repaired using a cosmetic field repair technique and be permanently repaired at propeller overhaul using a scarf type repair.
2 Paint the affected area.
3 Repair the propeller using the cosmetic surface repair technique by an approved McCauley composite propeller overhaul facility no later than the next propeller overhaul.

(c) Scrapes that affect areas in excess of 6.0 square inches or have damage that extends into the underlying fiberglass fabric and the damage is greater than 0.005 inch deep. Do the following:
1 A scarf repair shall be accomplished by an approved McCauley composite propeller overhaul facility before next flight.

(5) Cracks (excluding the leading edge guard). Pilot, operator, or aircraft mechanic assessment during visual inspection. A propeller blade that is suspected to have a crack must be taken to an approved McCauley composite propeller overhaul facility to confirm the condition of the propeller.
(a) Crack(s) in the epoxy material that do not extend into the underlying fiberglass may be repaired using a cosmetic surface repair.
(b) Crack(s) that are confined to the fiberglass layers of the propeller may be repaired using a scarf repair.
(c) Crack(s) that extend past the fiberglass layers of the propeller and into the carbon fiber layers of the propeller, the propeller must be removed from service and scrapped.

(6) Leading Edge Guard and Laminate Coin Tap Tests. Pilot, operator, or aircraft mechanic assessment for initial test. If a delamination is suspected, the propeller must be taken to an approved McCauley composite propeller overhaul facility to confirm the delamination condition. Refer to Guard and Laminate Tap Tests (Coin Tap Inspection) for Coin Tap Inspection Procedures.
(a) Leading Edge Guard Delaminated Less than 0.5 Square Inch. Repair leading edge guard or replace leading edge guard. This repair will require specialized tools and training to accomplish. The propeller leading edge guard repair or replacement must be accomplished by an FAA approved Part 145 Propeller Repair Station or international equivalent by personnel trained to repair McCauley composite propeller components or the propeller must be removed from service and scrapped.
(b) Leading Edge Guard Delaminated 0.5 Square Inch or more. Do not operate the propeller with a leading edge guard that has 0.5 square inch or more area of debond. Replace the leading edge guard. This repair will require specialized tools and training to accomplish. Propeller leading edge guard replacement must be accomplished by an FAA approved Part 145 Propeller Repair Station or international equivalent by personnel trained to repair McCauley composite propeller components or the propeller must be removed from service and scrapped.

(7) Delamination (excluding the leading edge guard).
(a) This is a condition that will require specialized tools and training to determine the extent of delamination. Propeller blades that are suspected to have delaminated material must be taken to an FAA approved propeller repair station or international equivalent facility. The FAA approved propeller repair station or international equivalent shall contact McCauley Product Support to help determine if the propeller blade is repairable or must be removed from service and scrapped.

(8) Propeller Tip or Trailing Edge Area Damage (damage that is not a nick, gouge, or scrape).

NOTE: Epoxy pieces may still be attached to the composite (fiberglass or carbon fiber) fabric.

(a) This is a condition that will require specialized tools and training to determine the extent of damage. Propeller blades that have sustained this type of impact damage must be taken to an FAA approved propeller repair station or international equivalent facility. The FAA approved propeller repair station or international equivalent shall contact McCauley Product Support to help determine if the propeller blade is repairable or must be removed from service and scrapped.

(9) Exposed Blade Core Foam. If the propeller blade core foam is visible the propeller must be removed from service and scrapped.

(10) Notable Vibrations. Pilot, operator, or aircraft mechanic assessment for unusual vibration, if unusual vibration is suspected, the propeller must be taken to an FAA approved propeller repair station or international equivalent facility for additional tests to confirm the condition of the propeller.

(11) Dimensional Measurements vs Limits. This is a test that requires specialized tools and training to accomplish by an FAA approved propeller repair station or international equivalent facility. Propellers that are found to have dimensional measurements beyond the established limits must be repaired or removed from service and scrapped.
(12) Leading Edge Guard Crack(s). Leading edge guards that have a total combined crack length of 3 inches or any two cracks that are within 1 inch of each other. This is a condition that will require specialized training to determine the extent of leading edge guard cracking. Propellers with leading edge guards that are cracked beyond these limits must have the leading edge guard replaced by an FAA approved propeller repair station or international equivalent facility or the propeller must be removed from service and scrapped.
(13) Erosion Damage Reconstruction. This repair will require specialized tools and training to do successfully. This type of repair can only be done by an approved McCauley composite propeller overhaul facility.
(14) Delamination in the propeller blade shank area (area up to blade station 4.8). This is a condition that will require specialized tools and training to determine the extent of delamination. Propeller blades that are suspected to have delaminated material in the shank area must be taken to an FAA approved propeller repair station or international equivalent facility. The FAA approved propeller repair station or international equivalent shall contact McCauley Product Support to help determine if the propeller blade is repairable or must be removed from service and scrapped. If the delamination extends inboard of blade station 4.8 (beginning of the urethane collar) the delamination is not repairable and the blade shall be removed from service and scrapped.
(15) One or more Carbon fiber Plies are Damaged. Propellers found with carbon fiber ply damage, the propeller must be removed from service and scrapped.
(16) Burn Damage or Discoloration. Propellers that exhibit signs of burning or heat damage must be removed from service and scrapped.

14. Non-Destructive Inspection Procedures

A. Visual Inspection
(1) Refer to Daily or Preflight Inspection for requirements to visually inspect the propeller.

B. Guard and Laminate Tap Tests (Coin Tap Inspection)
(1) Description
(a) This is a test that maybe be performed at the operator level to determine if there is a possible delamination in the propeller. McCauley composite propeller overhaul facilities will also use this test to help determine the extent of any suspected damage.

NOTE: Any indications by coin tap testing of a delamination at the owner/operator level must be evaluated and/or repaired by an FAA approved Part 145 Repair Station or international equivalent with personnel trained to repair McCauley composite propellers before continued operation.

(2) Tools Required
(a) A large coin, washer or metal disk shaped tool weighing no more than 1 ounce, (28.35 g).
(3) Inspection Procedure
(a) Establish a grid on each surface to be inspected 0.5 inches by 0.5 inches (12.7 mm by 12.7 mm) using an erasable marker. Do not use a graphite pencil.

NOTE: A smaller grid can be used if desired. The leading edge guard may require a 0.25 inch by 0.25 inch grid (6.35 mm by 6.35 mm).

NOTE: The acoustic response changes over the gridded area. The acoustic response from each tap should only be compared to adjacent/contiguous areas of similar structural thickness and composition. For example, the composite area over a foam core at blade station 20 will have a different acoustic response than the composite area over the blade shank at blade station 9.

(b) Tap the area to be inspected with a coin at each grid point. Pay particular attention to the leading edge of the leading edge guard.

(c) Possible areas of delamination should be indicated by a distinct change in the coin tap sound.

(d) If an area of delamination is detected, map the delaminated area by tapping at regular intervals between the mapped grid points.

NOTE: When tap testing to confirm a suspected delaminated area, tap test the same area on an unaffected propeller blade and compare the noise response from both blades.

(e) Any indications of possible delamination or debonding shall be reexamined by an FAA approved Part 145 Repair Station or international equivalent with personnel trained to inspect McCauley composite propellers before continued operation.

CLEANING/PAINTING/PROTECTIVE TREATMENTS

1. General

A. Cleaning Procedures

CAUTION: Do not clean any McCauley propeller part with a steel brush, other metal brush, hard bristle brush, or tool of any type not specified.

CAUTION: As applicable during cleaning procedures, observe allowable dimension limits established for certain parts.

(1) Remove dirt, paint (when applicable), grease and oil from all disassembled metal parts of propeller.
(2) Use McCauley approved cleaning mediums only (Refer to Table 701).
(3) Clean all small, highly finished parts separately.
  (a) Be careful not to damage small metallic parts, especially on working faces.
  (b) Clean nonmetallic parts (except gaskets, packings, and seals) by wiping with a soft, lint-free cloth dampened with an approved cleaning medium.
  (c) Remove thick or packed-on grease or dirt with a soft brush.
  (d) Allow cleaned parts to air dry.

NOTE: Remove excess moisture with a gentle stream of clean, dry compressed air keeping nozzle of air hose well away from parts.

(4) Protect cleaned parts from collecting dust and dirt during storage or during handling at overhaul.

NOTE: Keep small parts in transparent plastic bags.

2. Consumable Material

A. General
(1) This section contains information on materials commonly used for cleaning, repair, rework, painting, etc.
(2) Contact McCauley Propeller Systems for approval to use materials not included on these lists.

WARNING: Some of the chemicals used for cleaning, painting or for applying a protective treatment can be harmful to the skin and eyes. The manufacturer's safety precautions must be obeyed when handling cleaning, painting or protective treatment materials.

B. Material Control Requirements
(1) Materials purchased from McCauley Propeller Systems will be labeled with a McCauley expiration date and control information. This information is required by McCauley and will be in a different location from the manufacturer's label. McCauley expiration and control information takes precedence should there be any conflicting information with the manufacturer's information.
(2) For materials purchased from other sources, the purchaser is required to record the expiration date control information on the package.

C. Date Code Formats
(1) Expiration date may be recorded using the letters "exp" followed by a month and year. In this case, the shelf life of that material extends through the last day of the month and year recorded.
(2) Cure date for elastomeric products such as O-rings, gaskets, and hoses is normally recorded on the packaging using the numbers 1-4, the letter "Q," and the last two numbers of the year. This marking indicates that the material was cured during a particular "quarter" (i.e. three month period) of the stated year. For example, 1Q12 indicates a cure date of the first quarter of 2012.

(3) Cure date marking will suffice for control purposes. The actual date of expiration will occur after the last day of the quarter in the year projected from the cure date plus the allowable number of years for storage.

D. Consumable Material Management Procedures
(1) Rotate stock on a first in-first out basis.
(2) Epoxy and other materials normally require, at minimum, a room temperature cure. Lower temperatures may greatly increase the cure time. Temperatures below 60°F (16°C) may cause the epoxy to not cure at all.
(3) The maximum storage time for O-rings:
(a) All O-rings must adhere to the storage guidelines set forth in the SAE ARP 5316.

NOTE: All O-rings used to mount the propeller have a 15 year storage life if stored in accordance with SAE ARP 5316.

(4) Deice Boots.
(a) Deice boots do not have a shelf life if stored in accordance with the manufacturer's instructions.
(5) Lubricants
(a) Table 701. provides a listing of lubricants approved for use in McCauley products.

Table 701. Lubricants

Part Number	Description	Manufacturer	Notes
A-1637-4	Orelube K-2	Orelube Corp. 201 E. Bethpage Rd. Plainview, NY 11803 Phone: 516-249-6500	Molybdenum disulfide non-melt grease
A-1637-16	Grease MIL-T-83483	Convoy Oil Corp. 1412 Front street Philadelphia, PA 19122 Phone: 215-739-5281 Fax: 215-739-6933	Used on TCM mounting studs.
	LPS-3 Heavy duty Rust Inhibitor	LPS Laboratories 7647 Hugh Howell Road Tucker, GA USA 30085-9206 Fax: 770-493-9206	In corrosive environments, spray on the propeller blade retaining snap ring area to prevent corrosion of the propeller hub blade retention area.

(6) Adhesives and Sealants
(a) Table 702. provides a listing of sealants approved for use in McCauley products.

Table 702. Adhesives and Sealants

Part Number	Description	Manufacturer	Notes
A-1664-15	Scotch-Grip Brand Rubber Adhesive #1300L	3M Company Bldg. 209 2S 31 3M Center St. Paul, MN 55144 Phone: 651-733-9288 Fax: 651-736-8336	
A-1664-16	De-icer Conductive Cement #A-56-B	Sovereign Specialty Chemicals SIA Adhesives, Inc 123 W. Bartges Street Akron, OH 44311-1081 Phone: 330-374-2900 Fax: 314-771-1858	
A-1664-17	82-076 De-ice Boot Edge Sealer Kit	BFGoodrich De-Icing and Specialty Systems 1555 Corporate Woods Pkwy. Uniontown, OH 44685 Phone: 800-334-2377	Equivalent to Sterling Lacquer's system
A-1664-17	De-ice Boot Edge Sealer F63B12	Sherwin-Williams 101 Prospect Ave N. W. Cleveland, OH 44115 Phone: 216-566-2902	Mix eight parts sealer to one part accelerator.
A-1664-17	De-ice Boot Edge Sealer 78-A-1003	Sterling Lacquer Mfg. Co. 3160 Brannon Ave. St. Louis, MO 63139 Phone: 314-776-4450 Fax: 314-771-1858	Mix two parts (A-1664-17) with one part (A-1664-18).
	Bostik 1096M Adhesive	Bostik Findley, Inc. 211 Boston Street Middleton, MA 01949-2128 Phone: 978-777-0100 Web: www.bostik.com	
	Bostik 1008 Cement	Bostik Findley, Inc	
A-1664-29	Epoxy Adhesive (One ounce tube, 5 minute set-up time)	Pacer Technology 9420 Santa Anita Ave Rancho Cucamonga, CA 91730 Email: www.pacertechnology.com	For sealing deice boot restrainer strap.

Table 702. Adhesives and Sealants (continued)

Part Number	Description	Manufacturer	Notes
A-1664-30	Epoxy Adhesive (One ounce tube, 30 minute set-up time)	Pacer Technology	For sealing deice boot restrainer strap.
100416	Metal Glaze - Base (30 fl. oz filler)	ITW/Evercoat 6600 Cornell Road Cincinnati, OH 45242 Phone: (513) 489-9229 Fax: (513)489-9229	Finishing and blending Putty - Base (Used for localized repair in the propeller surface) **NOTE:** When ordering the Metal Glaze part number 100416, the part number 100354 (2.75 oz. cream hardener) will be shipped with the part number 100416 Metal Glaze - Base. **NOTE:** Evercoat packages the Metal Glaze material in different quantities than the 30 oz. size listed . If a smaller amount of Metal Glaze is desired, check with the manufacturer for size (10041X) and availability.
100354	Metal Glaze - Catalyst (2.75 oz. cream hardener)	ITW/Evercoat	Finishing and blending Putty - Catalyst (Used for localized repair in the propeller surface) **NOTE:** Evercoat packages the Metal Glaze cream hardener material in different quantities than the 2.75 oz. size listed. If a different amount of Metal Glaze cream hardner is desired, check with the manufacturer for size (1003XX) and availability.

(7) Paint and Protective Finish

(a) Table 703. provides a listing of recommended paints, primers and finish materials for use on McCauley products.

Table 703. Paint and Protective Finish

Part Number	Description	Manufacturer	Notes
P60G2	Wash primer	Sherwin-Williams 591 Somerset Tr NE Atlanta, GA 30306 Phone: (404) 885-5510	P60G2 Wash primer to be mixed with R7K44 Reducer
R7K44	Reducer	Sherwin-Williams	R7K44 Reducer to be mixed with P60G2 Wash primer
F563TXB11492-4302	Flat Black	Sherwin-Williams	Polane-T Topcoat
F63TXW11445-4302	White	Sherwin-Williams	Polane-T Topcoat
F63TXA11582-4302	Gray	Sherwin-Williams	Polane-T Topcoat
F63TXR11347-4302	Red	Sherwin-Williams	Polane-T Topcoat
F63TXS14433-4302	Silver	Sherwin-Williams	Polane-T Topcoat
F63TXW15926-4302	Matterhorn Weight	Sherwin-Williams	Polane-T Topcoat
V66V27	Catalyst	Sherwin-Williams	Polane-B Base Component
R7K84	Thinner	Sherwin-Williams	Polane-B Base Component
F63B13	Static Black, Hi Gloss	Sherwin-Williams	Polane-B Topcoat
F63BXH12027	Cirrus Linen White/Beige	Sherwin-Williams	Polane-B Topcoat
	Alodine 1200s	Henkel Surface Technologies 32100 Stephenson Highway Madison Heights, MI 19020 Phone: 248-583-9300	
	Turcoat Liquid Accelagold	Henkel Surface Technologies	
	Alodine 1201	Henkel Surface Technologies	
	207 High Temperature Aluminum Enamel	Plastic-Kote 1000 Lake Rd. Medina, OH 44256 Phone: 330-725-4511	
	#DE-1615 High Temperature Aluminum Enamel	Sherwin-Williams Dupli-Color Product Group	

(8) Cleaners and Solvents
(a) Table 704. provides a listing of approved cleaners and solvents for use on McCauley products.

Table 704. Cleaners and Solvents

Part Number	Description	Manufacturer	Notes
	MPK (methyl propyl ketone)	Commercially Available	
	Toluene	Commercially Available	Approved substitute for MPK
	Oil based Solvent Mixture: One part lubrication oil MIL-L-6082 Grade 10-30 and two parts MIL-PRF-680 Type II (Stoddard Solvent)		
	Mineral spirits MIL-PRF-680, Type. I, II, or III	Commercially Available	
	Isopropyl Alcohol T-T-735	Commercially Available	
	Perchlorethane	Commercially Available	
	Paint Remover MIL-R-81294	Commercially Available	
	Lacquer Thinner	Commercially Available	
	Acetone	Commercially Available	

(9) Miscellaneous Material

(a) Table 705. provides a listing of recommended miscellaneous materials for use on McCauley products.

Table 705. Various

Part Number	Description	Manufacturer	Notes
	Self-Adhesive Polyurethane Tape 8671	3M Company 3M Center St. Paul, MN 55144 Phone: 800-362-3550 Fax: 651-736-8336 Web: www.3m.com	
	Non-Etch Alkaline Cleaner NE-7 Cleaner	Enthone/Crookston Electronics 350 Frontage Rd. West Haven, CT 06516 Phone: 203-934-8611	
	Hypodermic syringe, 15 cc with 20- and 24-gauge needles	Commercially Available	
	masking tape, 0.25 inch (6.35 mm), 0.5 inch (12.7 mm), 1.0 inch (25.4 mm), 2.0 inch (50.8 mm)	Commercially Available	

Table 705. Various (continued)

Part Number	Description	Manufacturer	Notes
	cotton swab	Commercially Available	Medical or Cosmetic Grade, Non-sterilized
	cotton ball	Commercially Available	Medical or Cosmetic Grade, Non-sterilized
	clean, dry, lint-free cloths	Commercially Available	
	Abrasive paper 220, 300, 400, and 600 grit wet/dry	Commercially Available	
	Scotch Brite (alternative to sandpaper) medium, coarse, fine	Commercially Available	
	Safety wire (NASM20995C20, NASM20995C32, NASM20995C41)	Commercially Available	
	Syringe, 1.5 cc hypodermic with 20- and 24-gauge needles	Commercially Available	

3. Pre-Cleaning Procedures

Table 706. Approved Solvent and Cleaning Medium Applications

Medium	Application
Stoddard Solvent Type II MIL-PRF-680	to clean any metal surface
Methyl-propyl-ketone (MPK) or Acetone or equivalent	to clean metal surface prior to application of sealant
	to soften adhesion line between deice boot and blade
	to remove residual deice boot cement from blade
Perchlorethane	to clean aluminum part prior to dye penetrant inspection
Lacquer Thinner	to loosen grease on hub
	to loosen/remove general adhesives and sealants
	to loosen and remove decals

4. Blade Cleaning

A. Clean blade surfaces with a nonmetallic brush and/or plastic rubber scraper.

B. Thoroughly rinse cleaned blades with tap water and a soft brush.

5. Propeller Protective Treatments

A. Cadmium Plating

(1) Parts that require Cadmium plating shall be taken to an FAA approved Part 145 Propeller Repair Station or international equivalent for disposition and plating.

B. Cadmium Alternatives: Phosphate Treatment and Zinc-Nickel Plating
(1) Parts that require phosphate treatment or zinc-nickel plating shall be taken to an FAA approved Part 145 Propeller Repair Station or international equivalent for disposition and plating.

C. Nickel Plating
(1) Parts that require Nickel plating shall be taken to an FAA approved Part 145 Propeller Repair Station or international equivalent for disposition and plating.

D. Thermal Black Oxide Plating
(1) Parts that require Thermal Black Oxide plating shall be taken to an FAA approved Part 145 Propeller Repair Station or international equivalent for disposition and plating.

E. Chrome Plating
(1) Parts that require Chrome plating shall be taken to an FAA approved Part 145 Propeller Repair Station or international equivalent for disposition and plating.

F. Anodize

NOTE: All repaired and overhauled hubs must be anodized or have a Chemical Conversion Film Coating applied for corrosion protection.

(1) Parts that require to be anodized shall be taken to an FAA approved Part 145 Propeller Repair Station or international equivalent for disposition and to be anodized.

G. Chemical Conversion Film Coating

NOTE: All repaired hubs must be anodized or have Chemical Conversion Film Coating applied for corrosion protection.

(1) General
(a) The process for aluminum components must be in accordance with MIL-DTL-5541, Class 1A.
(b) All repairs must be complete before the part is treated.
(c) All grease, oil, or other material must be removed using solvent and/or a water based cleaner so the part, or the area of the part to be treated, has a water break free surface as required by MIL-DTL-5541.
(2) All parts that are chemical conversion film coated must have paint applied except on the engine mounting flange, cylinder mounting flange, and the area of the hub socket where the shim carrier contacts the hub.

CAUTION: Paint or primer is not allowed on the engine mounting flange, cylinder mounting flange, and the area of the hub socket where the anti-blade shake shim contacts the hub. This is a 4.135 inch (105.0 mm) diameter circle measured from the center of all blade sockets. Paint and primer are not allowed inside of hub socket on threadless propellers.

H. Corrosion Protection
(1) For propellers that operate in salt air or other corrosive environments:
(a) Apply LPS-3 around the blade retaining rings and shim carrier.

6. Blade Painting

NOTE: McCauley requires that all blades be painted. Paint and primer protect blades from erosion and ultraviolet radiation. McCauley recommends Sherwin-Williams products, but any industry equivalent is acceptable. The following procedure is recommended to repair or touch-up the propeller paint, but any procedure achieving similar results is acceptable.

NOTE: Repainting the entire propeller blade or the propeller assembly should only be accomplished at an FAA approved Part 145 Propeller Repair Station or international equivalent. Without the proper training and equipment, the static balance of the propeller can be affected by the application of paint.

NOTE: The propeller face side should be painted flat black unless otherwise noted.

A. Paint and Primer Mixtures.

NOTE: McCauley recommends Sherwin-Williams products, but any industry equivalent is acceptable. The following list of paints are recommended, but any equivalent paint that will achieve similar results is acceptable.

NOTE: All drying times are based on 77°F (25°C) and 45% relative humidity.

CAUTION: No paint or primer is allowed in the blade retention area.

(1) Primer should be tack free in 10 to 20 minutes and can be recoated in 30 to 60 minutes.
(2) Allow for different drying times at different temperatures and humidity levels.

Table 707. Paint and Primer Mixtures

Paint/Primer	Mixture Instructions
Wash Primer P60G2	1.0 Part Sherwin Williams P60G2 Industrial Wash Primer to 1.5 parts Sherwin Williams R7K44 Activator/Thinner **NOTE:** The wash primer is to be used on the aft face of the leading edge guard and painted aluminum surfaces.
Epoxy Fill Primer	1.0 Part Sherwin Williams CMO482300 base to 1.0 parts Sherwin Williams CMO120900 catalyst **NOTE:** The epoxy fill primer is to be used on composite propeller blade surfaces only.
Semi-Flat Black Paint F63TXB11492	Mix as directed by the manufacturer with V66V27 catalyst and R7K84 reducer (Note 1) Federal Standard 595 Color 37038
Semi-Flat White Paint F63TXV11445	Mix as directed by the manufacturer with V66V27 catalyst and R7K84 reducer (Note 1) Federal Standard 595 Color 17875
Semi-Flat Silver Paint F63TXS14433-4302	Mix as directed by the manufacturer with V66V27 catalyst and R7K84 reducer (Note 1)

Table 707. Paint and Primer Mixtures (continued)

Paint/Primer	Mixture Instructions
Semi-Flat Gray Paint F63YXA11582	Mix as directed by the manufacturer with V66V27 catalyst and R7K84 reducer (Note 1)
Gloss Yellow Paint F63BXY11719	Mix as directed by the manufacturer with V66V27 catalyst and R7K84 reducer (Note 1)
Semi-Flat Red Paint F63TXR11347	Mix as directed by the manufacturer with V66V27 catalyst and R7K84 reducer (Note 1) Federal Standard 595 Color 31136

NOTE 1: The color numbers are assigned by the Atlanta, Georgia Sherwin-Williams facility.

B. The painted surface must be recoated with the first coat of the finish enamel within four hours of application of the primer.

C. Apply the paint in accordance with the manufacturer's instructions.

NOTE: Overnight drying time is recommended after paint application.

D. The recommended dry film paint thickness on constant speed propeller blades should be 3 mils thick.

NOTE: Tip stripes should be painted on the camber side only so as not to interfere with the pilot's field of vision. Some propellers installed in a pusher configuration (and out of the pilot's field of view) may have a different paint scheme for the propeller blade tips.

7. Spinner Chrome Plating

A. McCauley does not approve the chrome plating of McCauley propeller spinners. Field experience has shown that chrome plated spinners often peel after a short time in service. Strong evidence also exists that chrome plating can lead to spinner fatigue cracking, thus scrapping the spinner shell. Chrome plating will void the McCauley warranty.

PROPELLER APPROVED REPAIRS

1. General Information

A. McCauley allows specific repairs, modifications to composite propellers. Only the changes to the original propeller configuration as specified by McCauley are allowed.

WARNING: Use only McCauley approved repair materials. Do not use materials that have not been approved by McCauley for the repair.

CAUTION: All disassembly, overhaul, testing, repair, and reassembly procedures of a McCauley composite propeller must be done by an FAA approved Part 145 Propeller Repair Station or international equivalent by personnel trained to repair McCauley composite propeller components.

CAUTION: Authorized propeller repairs are limited to procedures described in this manual and the propeller overhaul manual. Replace the propeller if the propeller is damaged beyond the repair limits permitted.

B. Refer to Propeller Blade Damage Assessment and Disposition, Table 602 and Table 603 to help determine the repairs required for the propeller.

2. Exposed Blade Core Foam

A. If the propeller blade core foam is visible the propeller must be removed from service and scrapped. No repairs are permitted on propellers with exposed blade core foam.

3. Delamination.

A. Small Area Delamination.
(1) A Small area Delamination is defined as being less than 6 square inches of total area, less than 4 inches along the longitudinal axis of the propeller, or less than 60% of local chord width. Propellers found with small areas of delamination must be removed from the airplane and taken to an FAA approved Part 145 Propeller Repair Station or international equivalent by personnel trained to repair McCauley composite propeller components. No repairs are permitted on propellers that are found to have a large area of delamination.

B. Large Area Delamination.
(1) A Large area Delamination is defined as being at least 6 square inches of area, over 4 inches along the longitudinal axis of the propeller, or over 60% of local chord width. Propeller blades found with large areas of delamination must be removed from service and scrapped. No repairs are permitted on propeller blades that are found to have a large area of delamination.

4. Cosmetic Field Repair

A. A cosmetic field repair is available to repair small nicks, gouges, scrapes, or missing material on the propeller blade camber or face sides. Reference Table 603 to identify composite material damage that can be repaired by using a cosmetic field repair.

NOTE: Cosmetic field repairs may be accomplished with the propeller installed on the engine/airplane. However, a better result may be achieved if the propeller is removed from the engine so that the area of repair can be held level while the finishing putty cures. The finishing putty has a tendency to run if applied to a surface that is not level.

NOTE: Material may be missing from the propeller blade as a result of a nick, gouge or scrape. The intent of this repair is to weather seal the damaged area to prevent continued degradation and allow the propeller blade to continue in service until overhaul.

NOTE: Cosmetic surface damage consists of damage which in no way affects the structural integrity of the reinforcing plies. Examples of cosmetic damage would include scratches, nicks, and gouges that do not extend into the underlying carbon fiber.

(1) Clean the damaged area with a clean cloth wet with isopropyl alcohol and allow to dry.
(2) Lightly sand the damaged area using 120 to 180 grit sandpaper to remove any rough or upturned edges. Do not sand into the composite fibers.
(3) Clean the damaged area again with a clean cloth wet with isopropyl alcohol and allow to dry.
(4) Mix the Metal Glaze finishing putty according to the manufacturer's instructions.

NOTE: Refer to Table 702, Adhesives and Sealants for the finishing putty manufacturer information.

(5) Apply the mixed putty using a small brush or applicator stick to the repair area. Apply only enough putty to coat and seal the area. It is not necessary to completely fill the damaged area level to the surface of the existing applied finish coatings.
(6) Place a square of waxed paper over the repair, sufficient to cover the putty and secure with tape. The purpose of the waxed paper is to act as a release film and produce a smooth level finish on the propeller blade.
(7) Allow the putty to cure undisturbed in accordance with the manufacturer's instructions.
    (a) The propeller must not be allowed to enter service until full strength of the putty is attained.
(8) Remove the waxed paper and securing tape after the putty has cured.
(9) Clean the repaired area with a clean cloth wet with isopropyl alcohol and allow to dry.
(10) Lightly sand the repaired area of the propeller blade surface to contour using 120 to 180 grit sandpaper followed by 220 grit sandpaper. Only remove excess putty that is above the propeller blade contour. Do not try to blend/smooth out a repaired area that is below the propeller blade contour.
(11) Clean the repaired area with a clean cloth wet with isopropyl alcohol and allow to dry.
(12) Touch up the paint. Refer to Cleaning/Painting/Protective Treatments, Blade Painting for paint touch-up instructions.

5. Carbon Fiber Ply Repair

A. If a carbon fiber ply of the propeller blade is damaged, the propeller must be removed from service and scrapped. No repairs are permitted on propeller blades that are found to have a damaged carbon fiber ply.

6. Leading Edge Guard Repair

A. Delamination

(1) Leading edge guard that is delaminated less than 0.5 square inch is repairable. The repair must be accomplished by an FAA approved Part 145 Propeller Repair Station or international equivalent by personnel trained to repair McCauley composite propeller components or the propeller blade must be removed from service and scrapped.
(2) Leading edge guard that is delaminated 0.5 square inch or more, the leading edge must be removed and replaced or the propeller blade must be removed from service and scrapped. The repair must be accomplished by an FAA approved Part 145 Propeller Repair Station or international equivalent by personnel trained to repair McCauley composite propeller components.

7. Spinner Repair

A. No repair is permitted on any McCauley spinner, spinner front support, or spinner bulkhead. Follow these guidelines to determine if a part is airworthy:
(1) If the part has scratches and minor dents, the part can continue to be used.
(2) If the part is cracked, the part must be replaced.

8. Hub Repair

A. All repairs to the propeller hub must be accomplished at an FAA approved Part 145 Propeller Repair Station or international equivalent by personnel trained to repair McCauley propeller hubs.

PROPELLER INSTALLATION PARTS LIST

1. Propeller Illustrated Parts List

A. Use the Installation Parts List to identify and order correct replacement parts for propeller field maintenance.

B. These parts may be purchased through your local authorized McCauley propeller service facility.

C. An exploded view of a typical McCauley propeller appears following the Master Deice Parts List (Tables 1001 and 1002). The index numbers for parts in the illustration are used to identity detail part numbers, assemblies, or groups of similar part numbers in the Parts List.

(1) Figure 1001and 1002 illustrates McCauley provided parts for propeller equipped with surface deice systems and for propellers with no deice equipment installed.

NOTE: Refer to 61-10-13 Anti-Ice System Illustrated Parts List for propellers equipped with McCauley supplied anti-ice equipment.

(2) Refer to the McCauley Propeller Systems Application Guide (MAG) and the aircraft type certificate data sheet or supplemental type certificate information for applications of specific part numbers.

NOTE: The MAG is **not** an FAA approved document, and is for reference only. Refer to the appropriate Type Certificate Data Sheet (TCDS) or Supplemental Type Certificate (STC) to verify information contained in the MAG.

Table 1001. McCauley Provided Parts (E-8049 and E-8093 Spinners, Go to Figure 1001)

INDEX NO.	PART NUMBER	DESCRIPTION	QTY	E-8049	E-8093
1	A-1639-2	Nut	6	X	X
2	A-1633-3	O-Ring	1	X	X
200	E-8082	Shell - Spinner	1		X
200	E-7999	Shell - Spinner	1	X	
201	C-8092	Spinner - Fillet Assembly	1		X
201	B-8003	Spinner - Fillet Assembly	1	X	
202	P34017898-01	Propeller Assembly (No Deice/Anti-ice equipment installed)	AR		X
202	P34017898-03	Propeller Assembly (No Deice/Anti-ice equipment installed)	AR	X	
203	D-8085	Spinner - Bulkhead Assembly	1		X
203	E-8000	Spinner - Bulkhead Assembly	1	X	
204	C-8091	Spinner - Front Support	1		X
204	C-8105	Spinner - Front Support	1	X	

Table 1001. McCauley Provided Parts (E-8049 and E-8093 Spinners, Go to Figure 1001) (continued)

INDEX NO.	PART NUMBER	DESCRIPTION	QTY	E-8049	E-8093
205	A-8008-1	Shim - 0.014 (0.36 mm)	AR	X	X
205	A-8008-2	Shim - 0.030 (0.76 mm)	AR	X	X
213	A-1638-5	Washer	21	X	X
214	A-1635-133	Screw	21	X	X
217	A-1638-15	Washer	6	X	X
218	A-2513-106	Bolt	6	X	X
219	C-8048	Bulkhead Mounting Plate Assembly	2	X	X
220	A-2513-104	Bolt	12	X	X
221	A-1638-56	Washer	12	X	X
225	B-6624	Decal - Spinner Instructions	1	X	X
McCauley Provided Deice Equipment					
202	P34017898-0330	Propeller Assembly (With 24 VDC Deice boots installed)	AR	X	
202	P34017898-0331	Propeller Assembly (With 12 VDC Deice boots installed)	AR	X	
206	A-2873-14	Clamp - Flat Cable	3	X	
208	A-1635-40	Screw	6	X	
209	A-1638-26	Washer	12	X	
210	A-1639-38	Nut	6	X	
216	A-40671	Grommet	3	X	
235	B-40746-30	Deice Boot (24 VDC)	3	X	
235	B-40746-31	Deice Boot (12 VDC)	3	X	
236	B-40251	Restrainer Strap	3	X	
237	A-20360-3	Nylon Cable Ties	3	X	
238	A-20360-4	Nylon Cable Ties	2	X	

Table 1002. McCauley Provided Parts (E8116-1, -2 Go to Figure 1002)

INDEX NO.	PART NUMBER	DESCRIPTION	QTY	E-8116-1, -2
1	A-1639-2	Nut	6	X
2	A-1633-3	O-Ring	1	X
200	D-8115	Spinner - Shell	1	X

Table 1002. McCauley Provided Parts (E8116-1, -2 Go to Figure 1002) (continued)

INDEX NO.	PART NUMBER	DESCRIPTION	QTY	E-8116-1, -2
201	C-8117	Spinner - Fillet Assembly	3	X
202	P34017898-04	Propeller Assembly	1	X
203	E-8114	Spinner - Bulkhead Assembly	1	X
204	C-8112	Spinner - Front Support	1	X
205	A-8008-1	Shim - 0.014 (0.36 mm)	AR	X
205	A-8008-2	Shim - 0.030 (0.76 mm)	AR	X
207	C-40772	Plate - Bulkhead Support	1	X
211	A-1635-36	Screw	12	X
212	A-1638-20	Washer	12	X
213	A-1635-133	Screw	36	X
214	A-1638-5	Washer	36	X
225	B-6624	Decal - Spinner Instructions	1	X
McCauley Provided Deice Equipment				
101	B-40746-30	Deice Boot	3	X
102	B-40251	Restrainer Strap	3	X
103	A-20360-3	Nylon Cable Ties	3	X
202	P34017898-0430	Propeller Assembly	AR	X
206	A-2873-14	Clamp - Flat Cable	3	X
207	D-40720	Slip Ring Assembly	1	X
208	A-1635-56	Screw	6	X
209	A-1638-18	Washer	12	X
210	A-1639-38	Nut	6	X
230	A-1638-17	Washer	12	X

Table 1002. McCauley Provided Parts (E8116-1, -2 Go to Figure 1002) (continued)

INDEX NO.	PART NUMBER	DESCRIPTION	QTY	E-8116-1, -2
231	A-1639-19	Nut	6	X
232	A-1639-18	Nut	6	X
233	A-40008	Washer	6	X

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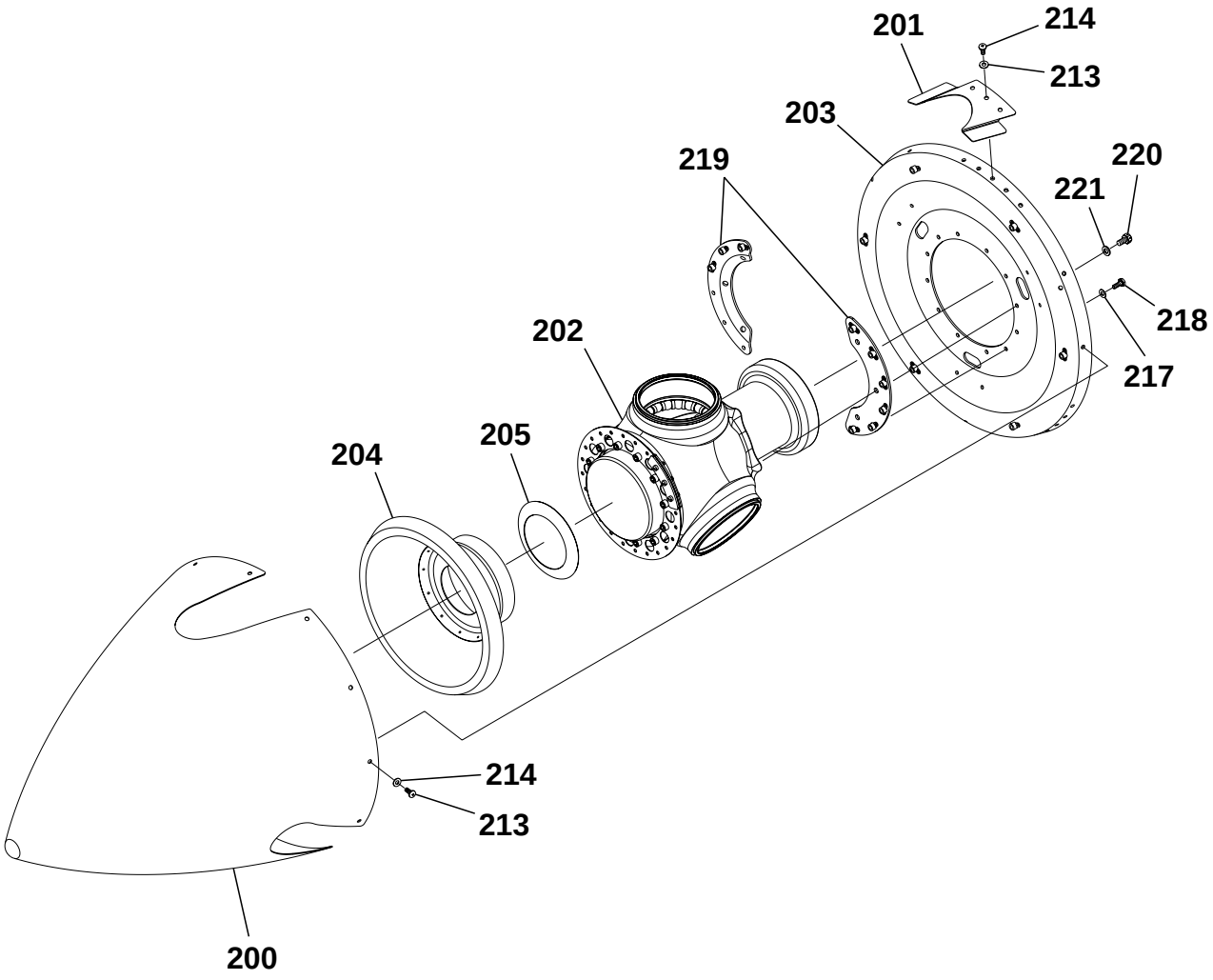

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E-8049 and E-8093 Spinner Installations
Figure 1001 (Sheet 1)

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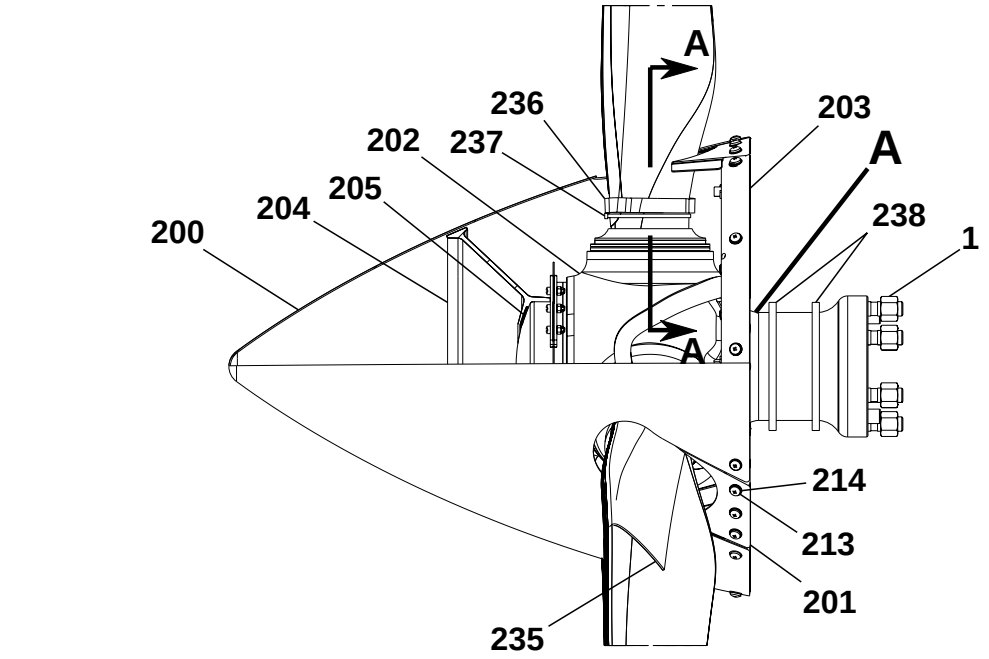

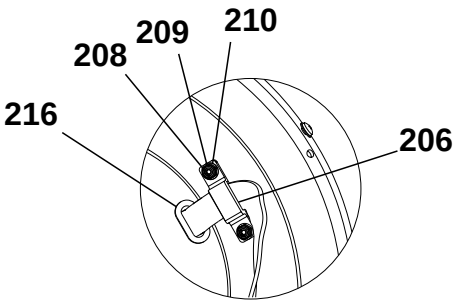

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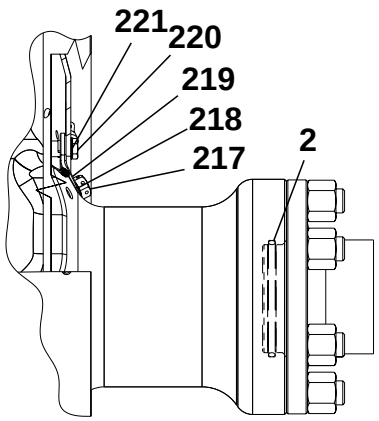

DETAIL A

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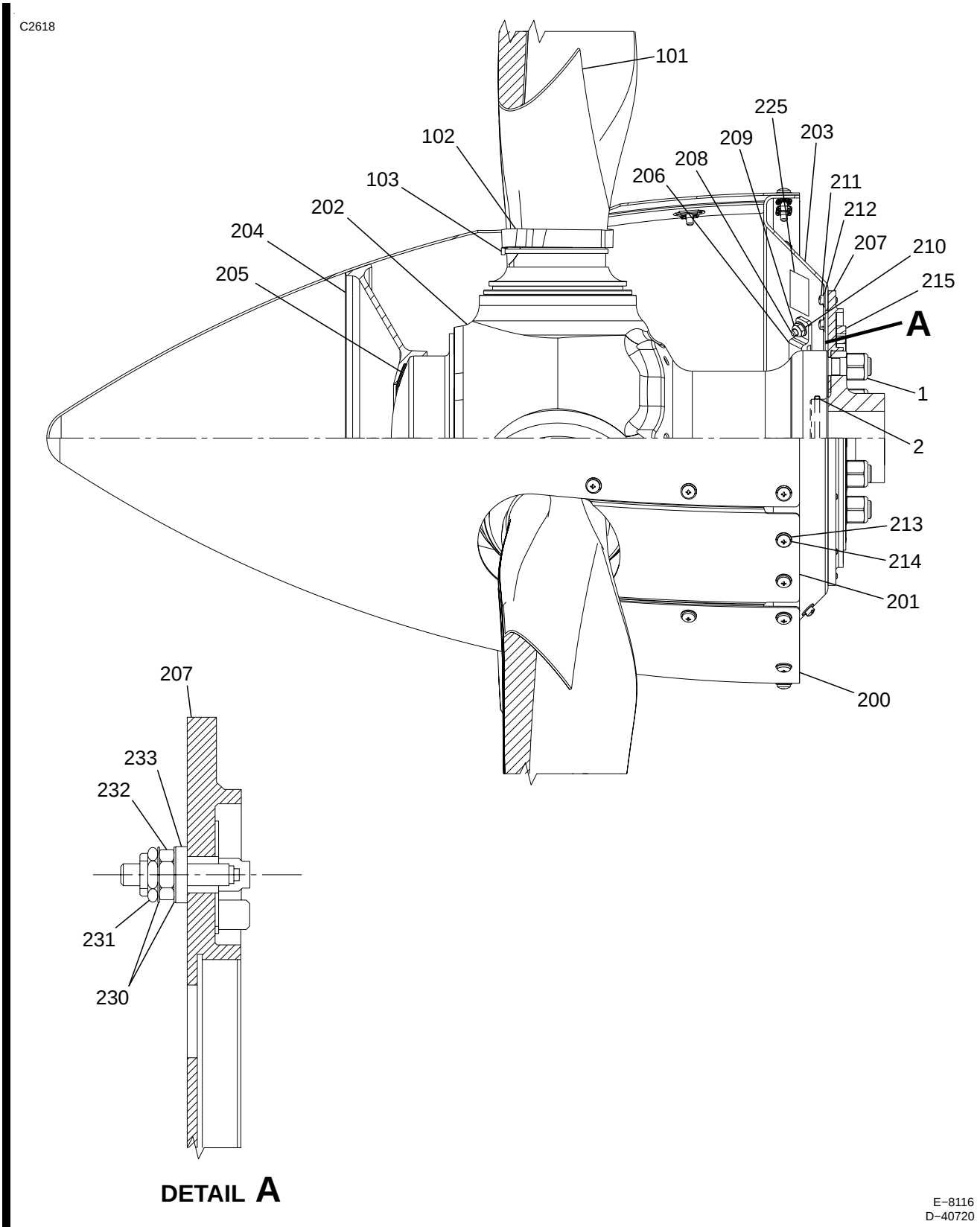
E-8049 and E-8093 Spinner Installations
Figure 1001 (Sheet 2)



McCauley Provided Spinner and Deice System (E8016-1, -2 Installations)
Figure 1002 (Sheet 1)

ANTI-ICE SYSTEM - MAINTENANCE PRACTICES

1. Introduction

A. This section provides installation, service, and parts information for propeller anti-ice systems and equipment manufactured by McCauley Propeller Systems.

NOTE: All data in this manual is applicable only to parts manufactured by McCauley. McCauley does not produce all of the components that are required for a working propeller fluid anti-ice system. The fluid holding tank, pump(s), fluid supply line to the propeller slinger ring, and control components are not supplied by McCauley. Information concerning maintenance of components not supplied by McCauley and concerning operation of the anti-ice system should be obtained from the airplane Type Certificate (TC) or propeller Supplemental Type Certificate (STC) holder/owner as applicable. Section 61-13-45, Anti-ice System Parts Lists, provides information where component part numbers manufactured by McCauley can be found.

2. Applicable Regulations

A. All maintenance and inspection procedures should be performed by qualified personnel. All work on anti-ice systems must comply with FAA Advisory Circular 43, Title 14 of the Code of Federal Regulations (CFR) Part 23, and superseding FAA releases. Where hardware or components have provisions for safety wiring, make sure that safety wire is installed in accordance with NASM33540, General Practices For Safety Wiring, Safety Cabling, Cotter Pinning.

3. Installation Description

A. The propeller anti-ice system components provided by McCauley can consist of the following:
- Anti-Ice Feed Shoes
- Slinger Ring
- Anti-Ice Supply Line
- Propeller Blade Supply Tubes and Hoses

4. Principles Of Operation

A. The anti-ice system is intended to prevent ice formation on the propeller blades of the airplane while operating in icing conditions. The Propeller Anti-Ice system includes propeller blade feed shoes, slinger ring, and supply tubes and hoses. The pilot controls the system by electrical switches that control the metering pumps that supply fluid to the propeller slinger ring.

5. Description of Anti-Ice System Components

A. Anti-Ice Feed Shoes.
(1) The anti-ice feed shoes are made of rubber and are attached to the inboard portion of each propeller blade. The shoes have grooves molded into them to provide a means of channeling or directing the anti-ice fluid over the surface of the propeller blade when the propeller is turning. Without the anti-ice shoes, the anti-ice fluid would not be evenly distributed over the propeller blades. One side of the shoe has a matte finish with grooves while the other side has a fabric impression finish to ensure a good bond between the shoe and the propeller blade.

B. Slinger Ring.
(1) The slinger ring is attached to the aft side of the propeller and catches the anti-ice fluid from the stationary propeller nozzle mounted on the engine and, using centrifugal force, directs the fluid to the tubes that supply fluid to the propeller blade spray head assembly. On some installations, the slinger ring is an integral part of the propeller aft spinner bulkhead.

C. Anti-Ice Supply Tubes and Hoses.
(1) The supply lines and hoses that take fluid from the slinger ring and directs it to the propeller blade feed shoes. On some propeller installations, the tube directing fluid to the propeller blade feed shoe will be referred to as a spray head assembly. On most installations, the tube directing fluid to the propeller blade feed shoe will be an integral part of the propeller spinner fillet assembly.

6. Materials Required

A. Materials required for Anti-Ice Components Installation.

Table 201. Consumable Materials Required for Propeller Anti-Ice Components Installation

Name	Part Number	Manufacturer	Quantity
Rubber Adhesive	1300L	3M Company 3M Ctr Bldg. 220-7W-03, Saint Paul 55144-1000 Web: www.3m.com	As required
Rubber Adhesive	EC1403	3M Company	As required
Sunbrite-Sterling Enamel Sealant	78-U-1003 with Catalyst U-1001-C	Sterling Lacquer Mfg. Co. 3150 Brannon Ave. St. Louis, MO 63139	As required
Fine Line Tape	218, 3/8 inch wide	3M Company	As required
Fine Line Tape	218, 1/2 inch wide	3M Company	As required
Fine Line Tape	218, 1 inch wide	3M Company	As required
Acid Brush	1/2 inch wide	Commercially available	As required
Paint Brush	3/4 inch wide	Commercially available	As required
Methyl n-Propyl Ketone (MPK)		Commercially available	As required
Acetone		Commercially available	As required
Toluol		Commercially available	Tackifying Solvent MPK may be used instead of Toluol to tackify cement. Toluol provides approximately 40 seconds of working time.
Cleaning cloth		Commercially available	Clean, lint-free cloth
2 inch rubber or wooden hand roller		Commercially available	To install deice boot
Lockwire	A-1640-5	McCauley	To secure fasteners
Blue Sentry Seal	A-1664-27	McCauley	To detect movement of fasteners

7. Propeller Anti-Ice Feed Shoes Removal and Installation

A. Remove the Propeller Anti-ice Feed Shoes (Refer to Figure 201).

WARNING: Cement and solvent vapors are toxic and extremely flammable. Use these chemicals only in a well ventilated area away from sparks and vapors. Excess exposure could cause injury or death. If dizziness or nausea occur, get to fresh air immediately. Avoid contact with skin or eyes. Use solvent-resistant gloves to minimize skin exposure. Use safety glasses to protect your eyes from chemicals. If you get chemicals in your eyes, flush your eyes with water for 15 minutes and see a physician immediately. If you get chemicals on your skin, wash thoroughly with soap and water. If you swallow chemicals, do not induce vomiting. See a physician immediately.

CAUTION: The jaws of any tool (vise grips, pliers, etc.) that you use to pull on the feed shoe must be cushioned to prevent damage to the feed shoe, unless the feed shoe is to be scrapped.

(1) Make sure all electrical power switches are in the OFF position.
(2) Check the alignment of the anti-ice feed tube with the propeller blade anti-ice feed shoe that is to be replaced.
  (a) Make sure the propeller is at low pitch.
  (b) Make sure the centerline of the anti-ice feed tube is positioned over the center of the first groove in the anti-ice feed shoe (first groove of the feed shoe from the propeller leading edge to the camber side of the propeller blade).
    1 If the centerline of the feed tube does not align with the center of the first groove of the anti-ice feed shoe, make sure the ant-ice feed tube, spinner fillet and spinner assembly are not damaged. Replace any damaged spinner or anti-ice system component.

      NOTE: It is important that the spinner components and the anti-ice feed tube are not damaged. The installed feed tube will be used to locate the replacement anti-ice feed shoe on the propeller blade.

(3) Remove the spinner from the spinner bulkhead.
  (a) Refer to the Propeller Removal and Installation Instructions, Spinner Assembly Removal for instructions to remove the spinner from the spinner bulkhead. Retain removed screws, washers and shims for later installation.

CAUTION: When you remove feed shoes from a propeller assembly, be careful not to let solvent leak into the propeller hub and cause damage to the seals. The blade that is being worked on must be pointed down so all excess solvent will run to the outboard tip of the propeller blade. As an extra precautionary measure, the hub and blade area must be masked. Do not use any sharp objects which might scratch the blade when you remove the feed shoe.

(4) Use methyl n-propyl ketone or toluene to soften the adhesion line between the anti-ice feed shoe and the propeller blade. Start at one corner and loosen enough of the feed shoe to grasp it with vise grips, pliers, or similar tool.
(5) Apply a steady pull to remove the feed shoe; pull the feed shoe from the blade slowly and carefully while you continue to use methyl n-propyl ketone or toluene to soften the adhesion line.
(6) Remove all residual cement from the blade. Use solvents with caution as mentioned above.

(7) Visually do an inspection of the propeller blade for damage or deterioration. Look for cracks, delamination, dents or nicks. If propeller blade damage is found, the propeller must be repaired by an authorized propeller repair station.

B. Install the Anti-ice Propeller Feed Shoes (Refer to Figure 201).
(1) General.
(a) All anti-ice feed shoes on a single propeller must be located the same distance from the center line of the propeller for rotational balance. The ("W") dimension for the location of the anti-ice shoe is given in Table 202 and shown in Figure 201.

Table 202. Aircraft and System Identification and Information

Aircraft Make and Model No.	Shoe Part Number	Dimension "W" See Note 2	McCauley Propeller Model No. / McCauley Propeller Part No.	Notes See Note 1
Cessna T240 Corvalis TTx	C-40323-81	2.428 to 2.302 Inches (61.67 to 58.47 mm)	D3A37C3401 P34017898-0381	Airplane TKS nozzle to propeller slinger ring minimum clearance is 0.05 inch (1.3 mm) minimum and 0.15 inch (3.8 mm) maximum forward of the rear edge of the slinger ring.
NOTE 1: McCauley propellers sometimes are provided to the aircraft manufacturer without the anti-ice shoes installed. In cases where the aircraft manufacturer installs the anti-ice shoes, or where no McCauley anti-ice shoes are used, the appropriate aircraft manufacturer's service manual or supplemental type certificate must be consulted for all installation information.				
NOTE 2: Anti-Ice Shoe Location Dimension "W" (Distance from the propeller blade retaining ring to the start of the feed shoe center groove.) See Figure 201.				

(2) Prepare the Propeller Blades for the Feed Shoe Installation.
(a) With the inboard end of the anti-ice feed shoe located at Dimension "W", position the feed shoe over the propeller blade leading edge.
(b) Make sure the propeller is at low pitch.
(c) Align the inboard end of the feed shoe, center of the first groove in the anti-ice feed shoe (first groove of the feed shoe from the propeller leading edge to the camber side of the propeller blade) with the centerline of the anti-ice feed tube.
(d) Align the outboard end of the feed shoe, to the propeller blade so that the feed shoe center line is on the leading edge center line of the propeller blade.
(e) Mark an area 0.5 inch (12.70 mm) outside the feed shoe perimeter on the propeller blade with a red pencil.
(f) Use the red pencil line as the perimeter of the area on each propeller blade to be masked.
(g) Install masking tape around the outline.

CAUTION: It is necessary that the masking steps described be followed so the sealer will be applied to both the cement and 0.125 inch (3.18 mm) of propeller blade surface. If the cement line and sealer line start at the same point, water will seep under the cement line and cause an unserviceable seal.

(h) On propeller blades painted with polyurethane, lightly sand inside the masked off area with 400 grit sandpaper.

NOTE: If the propeller has been painted with a lacquer base paint, carefully remove all paint inside of the masked off area on each propeller blade.

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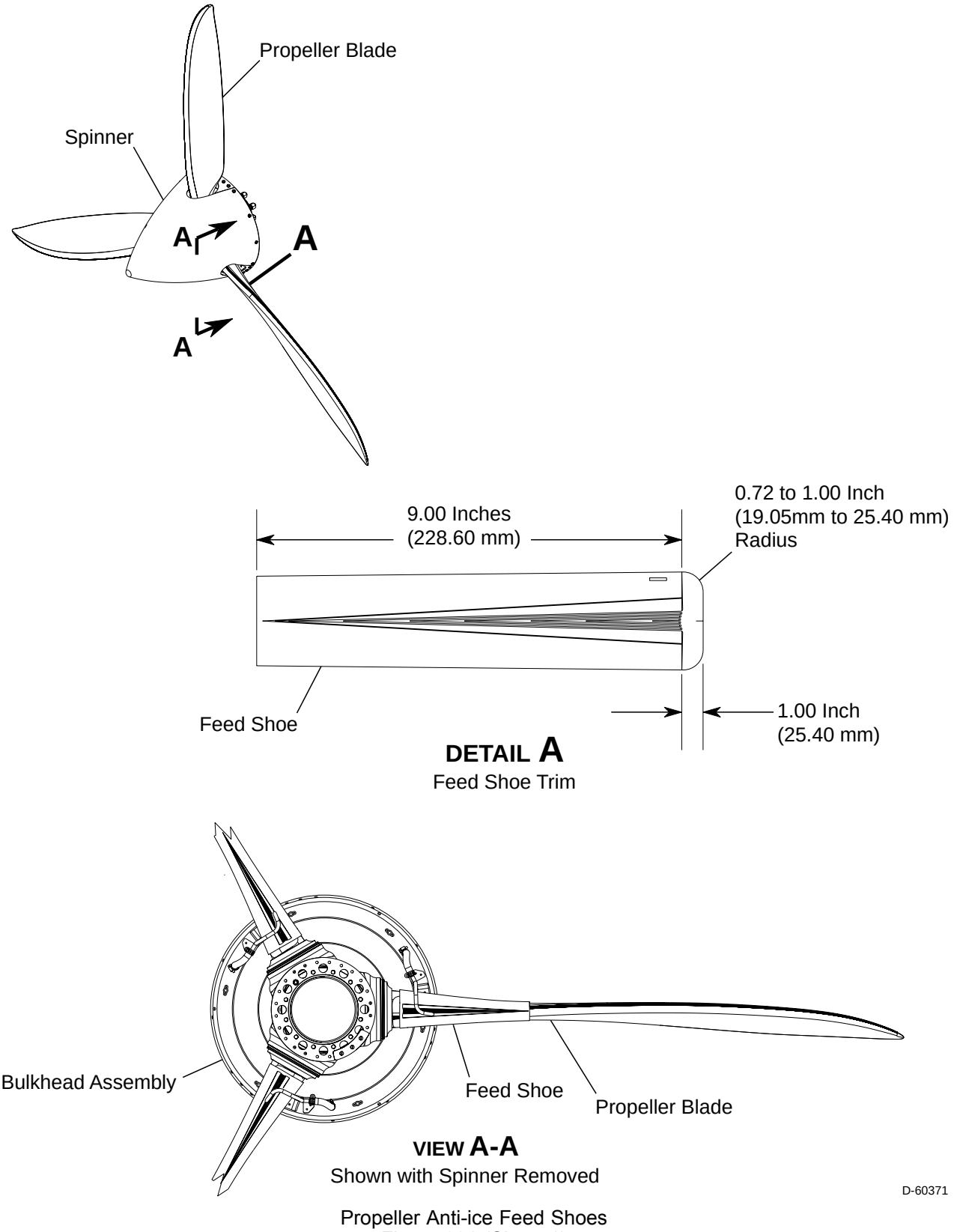

Propeller Anti-ice Feed Shoes
Figure 201 (Sheet 1)

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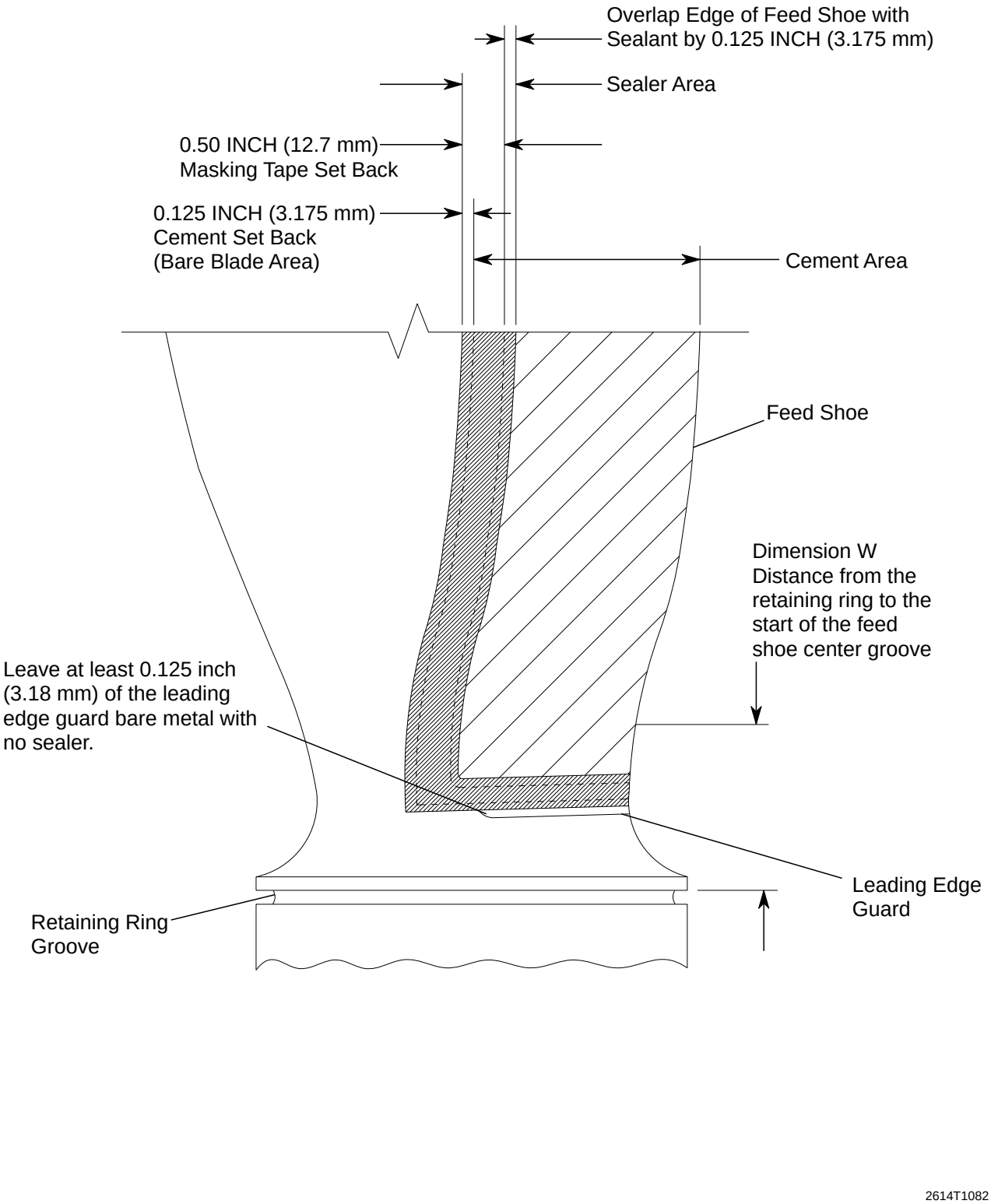

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Propeller Anti-ice Feed Shoes
Figure 201 (Sheet 2)

(i) Clean all of the masked area on each propeller blade thoroughly with methyl n-propyl ketone or acetone. Quickly clean the solvent from the propeller blades with a clean, dry, lint-free cloth so that you do not leave a film.
(j) Apply a second layer of masking tape on the propeller blades to cover an additional 0.125 inch (3.18 mm) of the propeller blade area inside of the previously masked area.

CAUTION: The propeller blade and rubber parts must be clean. Only very clean surfaces will cause maximum bond of the cement.

(3) Apply Cement to the Feed Shoes and the Propeller Blades.
(a) Lightly sand the bond surface of the feed shoe with sandpaper to cause maximum bond.
(b) Moisten a clean cloth with methyl n-propyl ketone or acetone. Clean the bond surface of the anti-ice feed shoe. Change the cloth frequently to avoid contamination of the clean area.

NOTE: You can use masking tape to prevent any curl of the anti-ice feed shoe edges when you apply cement to the back side of the feed shoe.

(c) Apply masking tape to the breeze side of the feed shoe edges. Let approximately 0.250 inch (6.35 mm) of the tape overhang the edge of the feed shoe.
(d) Lay the feed shoe with the bond side up on a clean piece of cardboard. Tape the feed shoe onto the cardboard with the 0.250 inch (6.35 mm) overlap of masking tape.
(e) Make sure to thoroughly mix the cement.
(f) Apply one even brush coat of 1300L or EC1403 cement to the clean, masked surface of the propeller blade and to the fabric impression side of the anti-ice feed shoe. Apply cement at a room temperature of 60° to 75°F (15.56° to 23.89°C).
(g) Allow the cement to air dry for a minimum of one hour at 40°F (4.44°C) or above, when the relative humidity is less than 75%. If the humidity is 75% to 90%, additional drying time will be necessary to cure the cement. Do not apply cement if the relative humidity is higher than 90%.
(h) After the cement is dry (not tacky), apply a second even brush coat to the anti-ice feed shoe. Then immediately apply an even brush coat of cement to the clean masked off area of the propeller. Timing is important because the cement on both surfaces must reach the tacky stage at the same time.
(4) Install Feed Shoe to the Propeller Blade.
(a) Make sure the cement is tacky on both the propeller blade and feed shoe surfaces.
(b) Remove the anti-ice feed shoe from the cardboard, and the masking tape from the anti-ice feed shoe before you start the installation.
(c) With the inboard end of the anti-ice feed shoe located at Dimension "W", position the feed shoe over the propeller blade leading edge.
(d) Make sure the propeller is at low pitch.
(e) Align the inboard end of the feed shoe, align the center of the first groove in the anti-ice feed shoe (first groove of the feed shoe from the propeller leading edge to the camber side of the propeller blade) with the centerline of the anti-ice feed tube.
(f) Align the outboard end of the feed shoe, to the propeller blade so that the feed shoe center line is on the leading edge center line of the propeller blade.
(g) Start the feed shoe installation at the inboard end of the blade and work toward the propeller tip.
(h) If the cement dries, apply methyl n-propyl ketone or toluene as necessary until the cement is tacky.
(i) If the feed shoe is off center, pull it up with a quick motion and install it again.
(j) Use methyl n-propyl ketone or toluene as necessary when you have to install the feed shoe again.
(k) When the feed shoe is correctly in place, use a rubber or wooden hand roller and press firmly on the full length of the leading edge to form a tight bond.

(l) Gradually push the roller over each side of the leading edge contour to avoid trapping air. Roll from the inboard leading edge of the propeller blade and work toward the tip. Work all excess feed shoe cement out to the perimeter before you move to the next section.

NOTE: Sometimes, if there is excess material at the feed shoe edges, the shoe edges may buckle and pull away from the surface of the propeller blade. If the edges of the shoe become distorted and pull away from the surface of the propeller blade, use your fingers and carefully work the edge of the shoe smooth.

(m) Remove the masking tape from the propeller blades.

(5) Apply Sealer to the Feed Shoes and Propeller Blades.

(a) Mix two parts of Sunbrite 78U1003 brushable black enamel with one part of enamel catalyst U-1001-C.

CAUTION: It is necessary that the masking steps described be followed so the sealer will be applied to both the cement and 0.125 inch (3.18 mm) of the propeller blade surface. If the cement line and sealer line start at the same point, water will seep under the cement line and cause an unserviceable seal (Refer to Figure 201).

(b) Apply one, even, brush coat of sealer to the area around the feed shoe and make sure you cover the 0.125 inch (3.18 mm) of blade surface next to the anti-ice feed shoe and adhesive along with the masked off area of 0.125 inch (3.18 mm) of the anti-ice feed shoe. Remove the masking tape as the sealer is brushed on, otherwise, the sealer will pull up along with the tape. Let the sealer dry.

(c) Immediately remove all masking tape including the fine line tape.

(d) Make sure there is at least 0.125 inch (3.18 mm) of bare metal exposed on the inboard end of the propeller blade leading edge guard. Failure to leave the inboard end of the leading edge guard bare metal will decrease the ability of the propeller blade to dissipate electricity in the event of a lightning strike on the propeller blade.

(e) Allow the sealant enamel to dry for at least one hour at 65 to 75°F (18 to 24°C) before you handle the feed shoe area, and at least 12 hours before starting the engine.

CAUTION: Do not run the engine with the spinner dome removed, damage will result to the spinner fillets due to the centrifugal force.

(f) Install the spinner with retained screws washers and shims, refer to the Propeller Removal and Installation Instructions, Spinner Assembly Installation for instructions to install the spinner on the spinner bulkhead.

8. Slinger Ring and Feed Nozzle Alignment Check

A. Propeller Feed Nozzle Alignment Check

(1) Examine the airplane propeller feed nozzle to the slinger ring alignment.

NOTE: The slinger ring will be attached to the aft side of the propeller spinner bulkhead.

(2) Measure the distance between the propeller feed nozzle and the slinger ring channel. Refer to Table 202, Aircraft and System Identification and Information for the propeller TKS feed nozzle clearance to the slinger ring.

(3) Adjust the propeller feed nozzle to direct the fluid stream to land in the slinger ring channel as necessary.

NOTE: The feed nozzle that provides TKS fluid to the slinger ring is not a McCauley supplied part, refer to the airplane maintenance manual for feed nozzle adjustment and maintenance information.

(4) Rotate the propeller slowly by hand and make sure the distance between the slinger ring and the feeder tube is in alignment tolerance. Adjust the feed nozzle as necessary to get the required alignment.

9. Propeller Anti-Ice Fluid Tubes Removal and Installation

A. Tube Removal (Refer to Figure 202, Figure 1001).

NOTE: Item numbers in parenthesis (XXX) refer to items identified in Figure 1001 unless specifically noted otherwise.

(1) Remove the propeller spinner, refer to the Propeller Removal/Installation section of this manual for instructions to remove the propeller spinner.
(2) Loosen the clamps (241) attaching the TKS spray head tube (part of the fillet assembly) and the slinger ring assembly.
(3) Remove the hose.

B. Tube Installation
(1) Position the hose on the spray head assembly and the slinger ring assembly.
(a) Make sure the hose is not twisted or kinked as it is routed around the propeller assembly.
(2) Secure hose with clamps (241).
(a) Make sure the clamps (241) are positioned towards the propeller hub in a manner that will not interfere with the propeller blade, spinner, or slinger ring assembly.
(b) After clamps (241) have been tightened and the hose (242) is secure, cut off and remove excess strap material from the clamps.
(3) Do a final check of hose routing to make sure the hose is not twisted or kinked as it is routed around the propeller blade and that there is sufficient length to the hose to allow for the propeller blade to travel without damaging the hose or the propeller assembly.
(4) Install the propeller spinner, refer to the Propeller Removal/Installation section of this manual for instructions to install the propeller spinner.

10. Bulkhead Assembly and Propeller Slinger Ring Assembly Removal and Installation

NOTE: Item numbers in parenthesis (XXX) refer to items identified in the Anti-Ice System Illustrated Parts List Figure 1001 unless specifically noted otherwise.

A. For part number P34017898-0381 propellers with E-8102 spinner assemblies (Cessna T240) installations:
(1) Removal.

NOTE: The slinger ring for Cessna T240 installation is an integral part of the spinner bulkhead assembly (203).

(a) Remove the propeller and spinner from the engine, refer to the Propeller Removal/Installation section of this manual for instructions to remove the propeller and propeller spinner.

NOTE: Spinner bulkhead will stay with the propeller as it is being removed from the engine.

(b) Make sure there is an alignment mark on the spinner bulkhead (203) to the No. 1 propeller blade. If the alignment mark has been removed, use a felt tip pin and make a new alignment mark.
(c) Remove and retain bolts (220) and washers (221) securing the spinner bulkhead assembly (203) to the bulkhead mounting plate assembly (219).
(d) Remove the spinner bulkhead assembly (203).
(2) Installation
(a) Align the spinner bulkhead (203) to the applicable propeller blade alignment marks.

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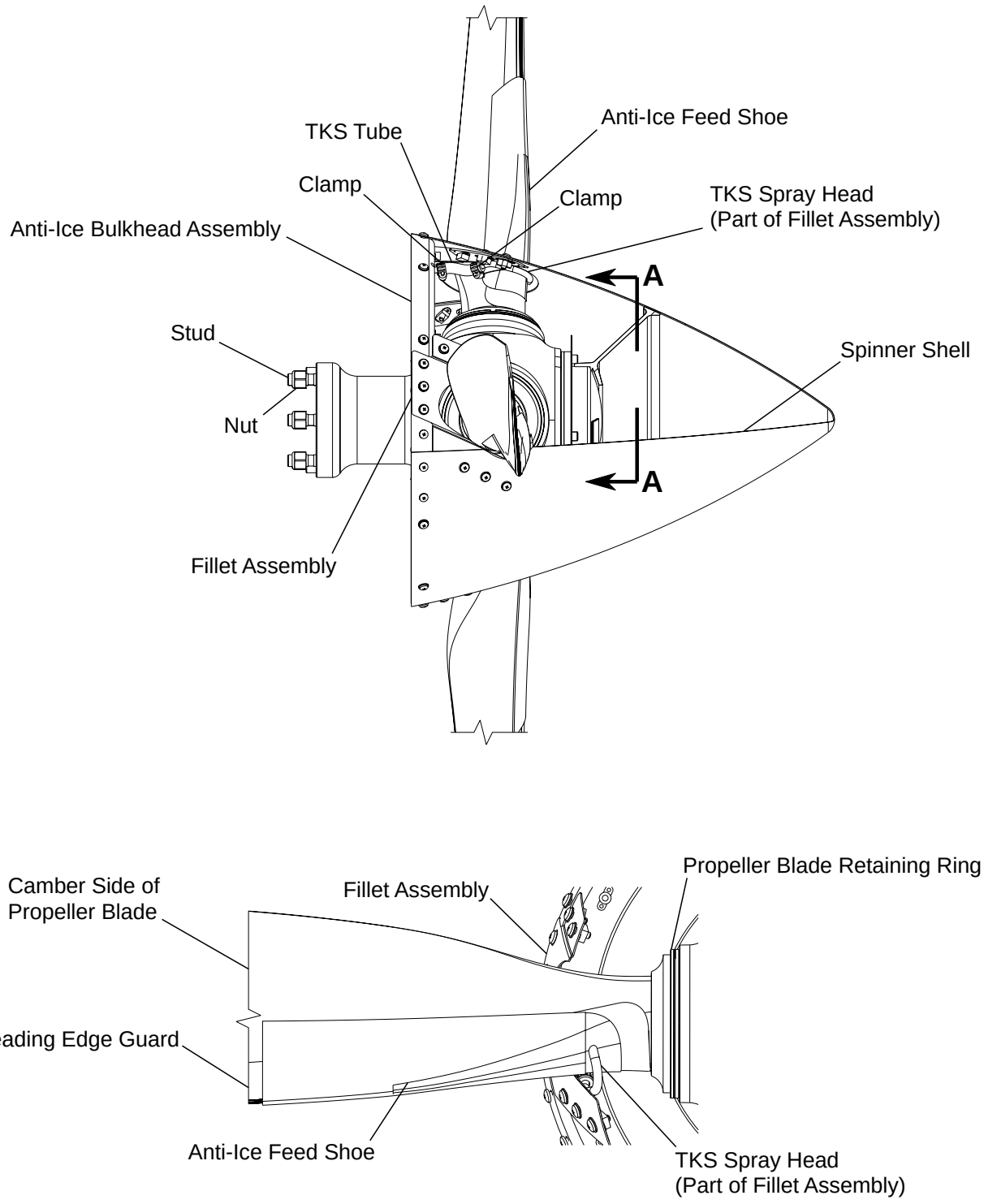

Typical Propeller Anti-Ice Installation
Figure 202 (Sheet 1)

(b) Secure the spinner bulkhead assembly (203) to the bulkhead mounting plate assembly (219) with retained bolts (220) and washers (221).
(c) Torque bolts (220) 30 to 36 inch-pounds (3.39 to 4.07 N-m).
(d) Install the propeller, refer to the Propeller Removal/Installation section of this manual for instructions to install the propeller.
(e) Check the clearances of the airplane TKS feed nozzle to the slinger ring, refer to Slinger Ring and Feed Nozzle Alignment Check for procedures to check the slinger ring clearance.
(f) Connect the spray head, part of the spinner fillet (201) to rubber tube (242) with clamps (241). Make sure the clamp is positioned to not touch the spinner bulkhead, propeller blade or fillet assembly.
(g) If required, trim excess clamp material after installation.
(h) Check the clearances of the airplane TKS feed nozzle to the slinger ring, refer to Slinger Ring and Feed Nozzle Alignment Check for procedures to check the slinger ring clearance.
(i) Check alignment of each TKS propeller blade spray tube with the propeller blade anti-ice feed shoe.
    1 With the propeller at low pitch, make sure that each spray tube is positioned to align with the first groove on the camber side of the feed shoe on the propeller blade.
    2 Make sure the clearance between the spray tube and the surface of the propeller blade is at least 0.060 inch (1.52 mm) and no more than 0.090 inch (2.29 mm) clearance between the spray tube and the feed shoe. Reposition the tube as required for each propeller blade.
(j) Install the spinner, refer to the Propeller Removal/Installation section of this manual for instructions to install the spinner.
(k) Make sure the propeller blades, TKS propeller blade spray assemblies, clamps and fluid tubes do not contact the propeller blade.

11. Troubleshooting

A. Refer to the airplane maintenance manual or STC holder maintenance instructions for troubleshooting information concerning anti-ice fluid supply to the propeller assembly.

B. Troubleshooting guide for McCauley installed components, refer to Table 203.

Table 203. Troubleshooting Guide

Trouble	Probable Cause	Corrective Action
1. No or insufficient fluid to the propeller blade feed shoe(s).	A. No or insufficient anti-ice fluid flow to the slinger ring.	Refer to the airplane maintenance manual or STC holder maintenance instructions for troubleshooting information concerning anti-ice fluid supply to the propeller slinger ring.
	B. Obstructions in the anti-ice fluid lines from the slinger ring assembly to the propeller blade spray head assembly.	Check for obstructions in the propeller fluid lines. Remove any observed obstructions.
	C. Engine side anti-ice fluid nozzle is not installed correctly to direct fluid to the slinger ring.	Do a Slinger Ring and Feed Nozzle Alignment check.
	D. Slinger Ring is damaged.	Replace Slinger Ring.
	E. Loose or disconnected propeller fluid lines or tubes.	Reconnect and secure propeller fluid lines or tubes.
	F. Damaged lines, tubes or nozzles.	Replace damaged components.

ANTI-ICE SYSTEM - INSPECTION/CHECK

1. General

A. The propeller anti-ice components should be inspected on a scheduled basis for condition and security.

2. 100 Hour Inspection

A. Remove spinner dome. Do not run the engine with the spinner dome removed or damage to the spinner fillets will occur.

B. Anti-Ice Shoes.
   (1) Closely check each anti-ice feed shoe for wrinkled, loose, or torn areas, particularly around the outboard edges. Look for abrasion or cuts, especially along the leading edge and the face or flat side of each propeller blade.
      (a) Foreign object damage must be given careful inspection, not just for damage to the feed shoe, but also for blade damage beneath the shoe. Shoe elasticity may obscure blade damage. If the feed shoe is damaged or cut completely through to the blade or if blade damage beneath a shoe is suspected, the shoe must be removed for blade surface inspection in the area of the feed shoe damage.

C. Slinger Ring.
   (1) Visually check the slinger ring for condition and security. Replace any slinger ring assembly that is cracked, warped or has an out-of-round condition. Make sure the fluid path in the slinger ring assembly is clean and free of any debris.
   (2) Check the slinger ring to airplane TKS feed nozzle clearance.
      (a) Refer to refer to Slinger Ring and Feed Nozzle Alignment Check for procedures to check the slinger ring clearance.

D. Propeller Blade Spray Assembly.
   (1) Visually check the spray assembly for condition and security. Replace any spray assembly that is cracked or has a noticeable dent. Make sure the tube is clear and free of any blockage.
   (2) Check alignment of each TKS propeller spray assembly with the propeller blade anti-ice feed shoe.
      (a) With the propeller set at low pitch, make sure the centerline of each propeller blade spray tube is aligned with the first grove on the propeller blade camber side (forward side) of the anti-ice feed shoe.
      (b) Check clearance between the spray tube and the surface of the propeller blade anti-ice feed shoe.
         1 For part number P34017898-381 propellers with E-8102 spinner assemblies, the clearance between the spray tube and the surface of the propeller blade anti-ice feed shoe is between 0.060 and 0.090 inch (1.52 and 2.29 mm).

E. Fluid Tubes.
   (1) Visually check the fluid tubes for condition and security. Replace any tube that is cracked, damaged, or is in a deteriorated condition.

ANTI-ICE SYSTEM ILLUSTRATED PARTS LIST

1. Illustrated Anti-Ice Parts List

A. An exploded view of a typical McCauley propeller supplied with anti-ice equipment appears following the Master Anti-Ice Parts List (Table 1001). The index numbers for parts in the illustration are used to identity detail part numbers, assemblies, or groups of similar part numbers in the Parts List.
(1) Figure 1001 illustrates McCauley installed anti-ice systems.
(2) Refer to the McCauley Propeller Systems Application Guide (MAG) and the aircraft type certificate data sheet or supplemental type certificate information for applications of specific part numbers.

NOTE: The MAG is **not** an FAA approved document, and is for reference only. Refer to the appropriate Type Certificate Data Sheet (TCDS) or Supplemental Type Certificate (STC) to verify information contained in the MAG.

Table 1001. McCauley Provided Anti-Ice Equipment Installation (E-8102 go to Figure 1001)

INDEX NO.	PART NUMBER	DESCRIPTION	QTY	E-8102 (D-60371-5)
1	A-1639-2	Nut	6	X
2	A-1633-3	O-Ring	1	X
200	E-40794	Shell - Spinner	1	X
201	C-40790	Spinner - Fillet Assembly	3	X
202	P34017898-0381	Propeller Assembly	AR	X
203	E-40795	Spinner - Bulkhead Assembly	1	X
204	C-8105	Spinner - Front Support	1	X
205	A-8008-1	Shim - 0.014 (0.36 mm)	AR	X
205	A-8008-2	Shim - 0.030 (0.76 mm)	AR	X
213	A-1635-133	Screw	42	X
214	A-1638-5	Washer	42	X
214	A-1638-5	Washer	21	
217	A-2513-106	Bolt	6	X
218	A-1638-4	Washer	6	X
219	C-8048	Bulkhead Mounting Plate Assembly	2	X
220	A-2513-104	Bolt	12	X
220	A-2513-42	Bolt	12	
221	A-1638-56	Washer	12	X
225	B-6624	Decal - Spinner Instructions	1	X

Table 1001. McCauley Provided Anti-Ice Equipment Installation (E-8102 go to Figure 1001) (continued)

INDEX NO.	PART NUMBER	DESCRIPTION	QTY	E-8102 (D-60371-5)
240	C-40323-81	Propeller Anti-Ice Shoe	3	X
241	A-2873-8	Clamp - Hose	6	X
242	A-2779-9	Tube- Rubber	3	X

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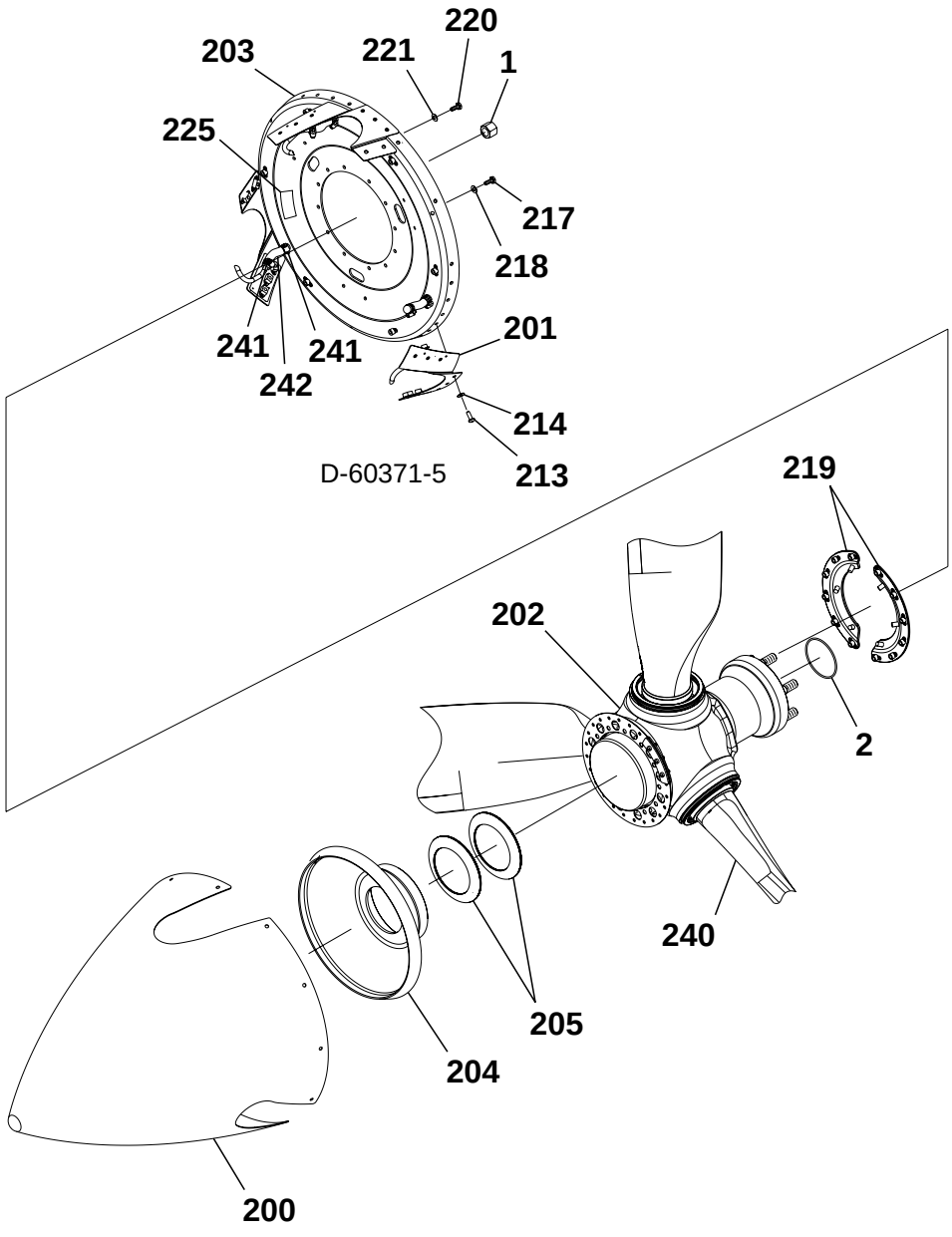

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McCauley Installed Anti-Ice System
Figure 1001 (Sheet 1)

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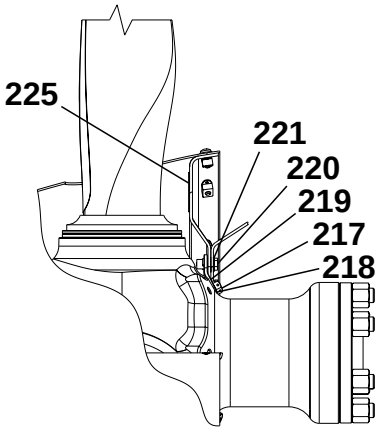
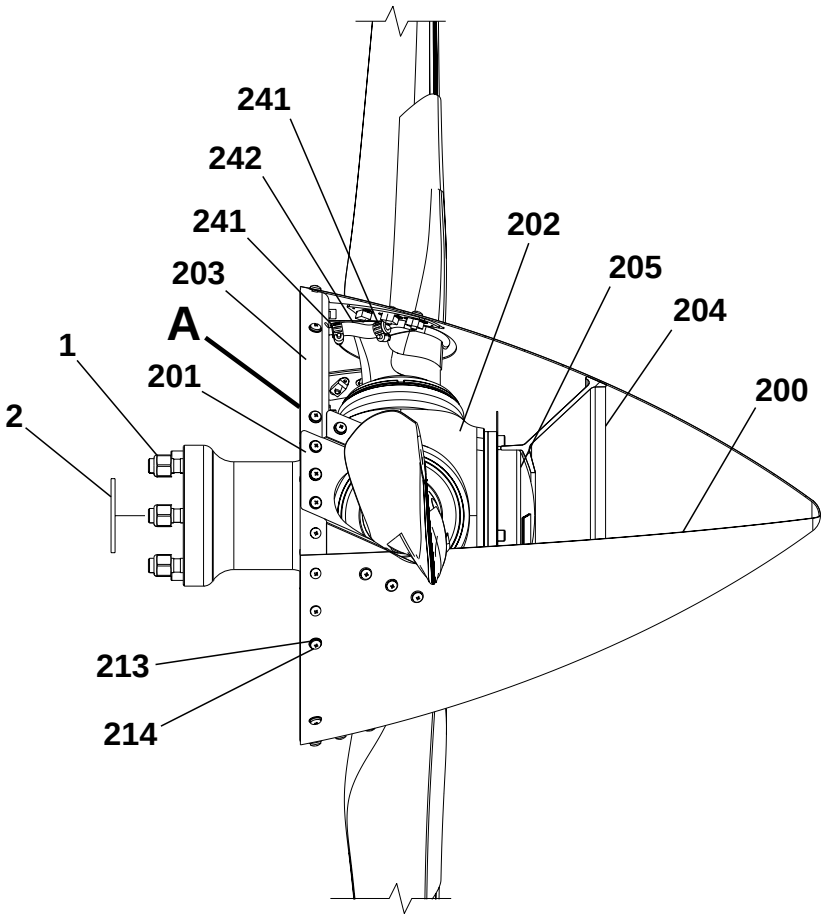


DETAIL A



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McCauley Installed Anti-Ice System
Figure 1001 (Sheet 2)