MODEL 208
MAINTENANCE MANUAL SUPPLEMENT

AERO TWIN, INC.

Maintenance Manual
Supplement
Document No. 208-4BP-MMS
REVISION 1

CESSNA
1985 & ON
MODEL 208
SERIES

The information contained herein supplements or supersedes the basic Maintenance Manual and Wiring Diagram Manual only in those areas listed herein. For maintenance information not contained in this supplement, consult the latest revision of the appropriate manual.

10 OCTOBER 2000

REVISION HIGHLIGHTS

Revised cover and List of Chapters to reflect the manual revision.

Added section 76-10-02

MODEL 208
MAINTENANCE MANUAL SUPPLEMENT

Revision Number	Issue Date	Date Inserted	Inserted By
1	10 October 2000	10 October 2000	HPI

LIST OF PUBLICATIONS

1. List of Manufacturers Technical Publications in addition to the existing list in the maintenance manual.

Note: Publications produced by Hartzell for the HC-D4N-3R/D9511F(K) propeller must be ordered directly from Hartzell. Manufacturer, publication names, numbers and addresses are listed below.

CHAPTER 30 - DEICE

Item	Cessna Part Number	Manufacturer Part Number	Publication Part Number	Publication Title	Manufacturer
Propeller De-ice Brush Block		3E2090-1	68-04-714K	Propeller De-ice System Brush Block Assembly Overhaul Manual and Illustrated Parts Catalog	BF Goodrich Aerospace Div. Engineered Polymer Products 325 Springside Dr. P.O. Box 5550 Akron, OH.
Propeller De-ice		4E3101-1	59-728N	Removal and Installation Manual for BF Goodrich Ice Protection Systems Report	BF Goodrich Aerospace Div. Engineered Polymer Products 325 Springside Dr. P.O. Box 5550 Akron, OH.

CHAPTER 61 - PROPELLERS

Item	Cessna Part Number	Manufacturer Part Number	Publication Part Number	Publication Title	Manufacturer
Propeller		HC-D4N-3R/ D9511F(K)	149	Propeller Owner's Manual & Log Book	Hartzell Propeller Products TRW Aircraft Components Group 1800 Covington Ave. Piqua, OH.
Propeller		HC-D4N-3R/ D9511F(K)	133	Aluminum Blade Inspection, Repair and Overhaul instructions	Hartzell Propeller Products TRW Aircraft Components Group 1800 Covington Ave. Piqua, OH.
Propeller Spinner		D630-3P	127	Spinner Assembly Maintenance Instruction Guide	Hartzell Propeller Products TRW Aircraft Components Covington Ave. Piqua, OH.

MODEL 208
MAINTENANCE MANUAL SUPPLEMENT

LIST OF CHAPTERS

AIRWORTHINESS LIMITATIONS

REPLACEMENT TIME LIMITS

1. General
   A. The following life limited components are to be replaced at the specified time. It is recommended that the components be scheduled for replacement during the airplane's inspection interval coinciding with, or occurring just before the expiration of the specified time limit. Procedures for replacement of the components are described in the applicable chapters in the Maintenance Manual.

2. Replacement Schedule
   A. Propellers (Chapter 61)
      (1) Hartzell HC-D4N-3R/D9511F(K) Propeller. Refer to the Hartzell Aluminum Blade Inspection, Repair and Overhaul Instructions and the Hartzell Spinner Assembly Maintenance Instruction Guide listed in the List of Publications in the front of this publication.

TIME LIMITS / MAINTENANCE CHECKS

CONTENTS

TIME LIMITS / MAINTENANCE CHECKS

INSPECTION TIME LIMITS

1. Inspection Interval Requirements

   A. Every 100 hours.
   B. Every 200 hours.
   C. Every 400 hours.
   D. Every 500 hours or 1 year, whichever occurs first.
   E. Every 800 hours or 1 year, whichever occurs first.
   F. Every 1000 hours or 1 year, whichever occurs first.
   G. Every 2000 hours or 2 years, whichever occurs first.
   H. Every 1 year.
   I. Every 2 years.
   J. Every 3 years.
   K. Every 4 years.
   L. Every 6 years.
   M. Every 12 years.
   N. Every 1200 hours or 1 year, whichever occurs first.
   O. Every 100 hours and every external engine wash or engine compartment wash.
   P. Every 500 hours.
   Q. Every 1200 hours or 2 years, whichever occurs first.
   R. Every 1000 hours.
   S. At 13,000 hours and every 4000 hours thereafter.
   T. At 10,000 hours and every 5000 hours thereafter.

TIME LIMITS / MAINTENANCE CHECKS

INSPECTION TIME LIMITS

REVISION STATUS	INSPECTION ITEM CODE NUMBER	DESCRIPTION	INTERVAL	OPERATION	ZONE
	306004	Prop Anti-ice Varister - This unit has been removed and no inspection is necessary.	-	-	-
	633001	Hartzell Propeller Spinner - Remove, wash, inspect for cracks, fractures, condition and security.	A	1, 2, 3, 4	110
	633002	Hartzell Spinner Bulkhead - Inspect for cracks, condition and security.	A	1, 2, 3, 4	110
	633003	Hartzell Propeller Blades - Wash, check for nicks, gouges, scratches, corrosion, leading edge looseness, depressions, erosion, cracks, condition and security.	A	1, 2, 3, 4	110
	633004	Hartzell Propeller Blades - Check alignment and freedom of movement.	A	1, 2, 3, 4	110
	633005	Hartzell Propeller Hub (exposed area) - Inspect for cracks, wear, condition, and security of components to hub.	A	1, 2, 3, 4	110
	633006	Hartzell Propeller - Inspect for oil and grease leaks.	A	1, 2, 3, 4	110
	633007	Hartzell Propeller Mounting - Visually check for security of installation.	A	1, 2, 3, 4	110
	633008	Hartzell Propeller Hub - Lubricate and check for security of blades. (Refer to Chapter 12 for type of lubrication, and Chapter 61 for specific lubrication instructions).	A	1, 2, 3, 4	110
	632001	Hartzell Beta System Feedback Ring - Inspect ring for condition, warpage and security of installation. Inspect carbon brush for wear and evidence of damage. Inspect linkage for condition and security. (Refer to Chapter 61).	B	1, 3	110
	632002	Propeller Governor and Overspeed Governor - Inspect for oil leaks, condition and security.	A	1, 2, 3, 4	121
	632003	Overspeed Governor - Inspect electrical connection wiring for evidence of damage and security.	C	1	121
	632004	Propeller Governor Operational check with engine running - Perform check.	A	1, 2, 3, 4	ENG

TIME LIMITS / MAINTENANCE CHECKS

COMPONENT TIME LIMITS

1. Component Time Limit

   A. All components not listed herein should be inspected as detailed in the basic Maintenance Manual, chapter 5, and repaired, overhauled or replaced as required. Items shown here should be overhauled or replaced during the regular maintenance periods falling due nearest to the specified limit.

   B. The replacement life of each component listed in this section applies to the part throughout its life on the original installation and on later installations. The life (number of hours or number of landings) must be recorded individually for these components and must remain with the component during removal. For example, if a component is removed for overhaul, it must be tagged with the life to the date of removal ant this tag must remain with the component throughout the overhaul process. (Overhaul of a component does not zero time the life of the component.) When received from overhaul and installed on an airplane the life of the component must be recorded to allow continued accumulation toward the life limit.

1. Schedule

   A. Propeller - Hartzell HC-D4N-3R/D9511F(K) (Chapter 61)
      (1) Propeller - Overhaul Refer to Service Letter SL61.
      (2) Governor (Woodward) - Overhaul Refer to Pratt & Whitney Service Bulletin number 1003.
      (3) Overspeed Governor (Woodward) - Overhaul at engine overhaul plus 500 hours.

TIME LIMITS / MAINTENANCE CHECKS

PROGRESSIVE CARE PROGRAM

1. Progressive Care Program

   A. Purpose and Use.

      (1) The Inspection Charts and Progressive Care Program is designed to assist the owner or operator in meeting the intent of FAR Part 91.409(a), (b), and (d). These Inspection Charts are not intended to be all inclusive, for no such charts can replace the good judgment of a certified airframe and powerplant mechanic in performance of his duties. As the one primarily responsible for the airworthiness of the airplane, the owner or operator should select only qualified personnel to maintain the airplane.

2. Construction

   A. Following is the recommended supplementary progressive inspection for Model 208, 208A, and 208B airplanes equipped with a Hartzell HC-D4N-3R/D9511F(K) propeller.

   B. The program is divided into four primary operations (operations 1 through 4) which cover all 100 hour, 200 hour, and 400 hour inspection requirements. The remaining operations include all of the inspection requirements due at other intervals and can be found in the basic Maintenance Manual.

   C. The inspection program is divided into operations to enable the progressive inspection to be accomplished.

      Operation 1 - Covers items in the engine, wing, empennage and fuselage areas.
      Operation 2 - Covers items in the engine, wing, and landing gear areas.
      Operation 3 - Covers items in the engine, wing, empennage and fuselage areas.
      Operation 4 - Covers items in the engine, wing, empennage and fuselage areas.

TIME LIMITS / MAINTENANCE CHECKS

PROGRESSIVE CARE PROGRAM

3. Procedure

   A. The inspection Time Limits Charts show the recommended intervals at which items are to be inspected based on normal usage under average environmental conditions. Airplanes operated in extremely humid areas (tropics), or in exceptionally cold, damp climates, etc., may need more frequent inspections for wear, corrosion, and lubrication. Under these adverse conditions, perform periodic inspections in compliance with this chart at more frequent intervals until the operator can set his own inspection periods based on field experience. The operator's inspection intervals shall not deviate from the inspection time limits shown in this manual except as provided below:

      (1) Each inspection interval can be exceeded by 10 hours (if time controlled), or by 30 days (if date controlled) or can be performed early at any time prior to the regular interval as provided below:

         (a) In the event of late compliance of any operation scheduled, the next operation in sequence retains a due point from the time the late operation was originally scheduled.

         (b) In the event of early compliance of any operation scheduled, that occurs 10 hours or less ahead of schedule, the next phase due point may remain where originally set.

         (c) In the event of early compliance of any operation scheduled, that occurs more than 10 hours ahead of schedule, the next operation due point must be rescheduled to establish a new due point from the time of early accomplishment.

   C. Component Time Limits should be checked at each inspection interval to ensure proper overhaul and replacement requirements are accomplished at the specified times.

4. Inspection Guidelines.

   A. The inspection Charts are to be used as a recommended inspection outline and are supplementary to the existing charts in the basic Maintenance Manual. Detailed information of systems and components in the airplane will be found in various chapters of the basic Maintenance Manual and the pertinent vendor publications. It is recommended that reference be made to the applicable portion of this manual or the basic Maintenance Manual for service instructions, installation instructions, and to the vendor's data or publications specifications for torque values, clearances, settings, tolerances, and other requirements.

TIME LIMITS / MAINTENANCE CHECKS

PROGRESSIVE CARE PROGRAM

B. Definitions and procedures

(1) For the purposes of this inspection program, the term "on condition" is defined as follows: The necessary inspections and/or checks to determine that a malfunction or failure of the component will not occur prior to the next scheduled inspection.

(2) For the purpose of this inspection program, the term "condition" is defined as follows: Inspect for, but not limited to, cleanliness, cracks, deformation, corrosion, wear, and loose or missing fasteners.

(3) MOVABLE PARTS: Inspect for lubrication, servicing, security of attachment, binding, excessive wear, safetying, proper operation, proper adjustment, correct travel, cracked fittings, security of hinges, defective bearings, cleanliness, corrosion, deformation, sealing, and tension.

(4) FLUID LINES AND HOSES: Inspect for leaks, cracks, bulging, collapsed, twisted, dents, kinks, chafing, proper radius, security, discoloration, bleaching, deterioration, and proper routing; rubber hoses for hardness or flexibility and metal lines for corrosion.

(5) METAL PARTS: Inspect for security of attachment, cracks, metal distortion, loose or broken terminals, heat deterioration, and corroded terminals.

(6) WIRING: Inspect for security, chafing, burning, arcing, defective insulation, loose or broken terminals, heat deterioration, and corroded terminals.

(7) STRUCTURAL FASTERNERS: Inspect for correct torque in accordance with applicable torque values. Refer to Bolt Torque Data during installation or when visual inspection indicates the need for a toque check.

NOTE: Torque values listed are not to be used for checking tightness of installed parts during service.

(8) FILTERS, SCREENS, AND FLUIDS: Inspect for cleanliness and the need for replacement at specified intervals.

(9) System check (operation or function) requiring electrical power must be performed using 28.5 Volts, ±0.25 Volts, bus voltage. This will ensure all components are operating at their operational voltage.

TIME LIMITS / MAINTENANCE CHECKS

PROGRESSIVE CARE PROGRAM

INSPECTION OPERATION 1

ITEM CODE NUMBER	DESCRIPTION	ZONE	MECH	INSP REMARKS
633001	Hartzell Propeller Spinner - Remove, wash, inspect for cracks, fractures, condition and security.	110		
633002	Hartzell Spinner Bulkhead - Inspect for cracks, condition and security.	110		
633003	Hartzell Propeller Blades - Wash, check for nicks, gouges, scratches, corrosion, leading edge looseness, depressions, erosion, cracks, condition and security.	110		
633004	Hartzell Propeller Blades - Check alignment and freedom of movement.	110		
633005	Hartzell Propeller Hub (exposed area) - Inspect for cracks, wear, condition, and security of components to hub.	110		
633006	Hartzell Propeller - Inspect for oil and grease leaks.	110		
633007	Hartzell Propeller Mounting - Visually check for security of installation.	110		
633008	Hartzell Propeller Hub - Lubricate and check for security of blades. (Refer to Chapter 12 for type of lubrication, and Chapter 61 for specific lubrication instructions).	110		
632001	Hartzell Beta System Feedback Ring - Inspect ring for condition, warpage and security of installation. Inspect carbon brush for wear and evidence of damage. Inspect linkage for condition and security. (Refer to Chapter 61).	110		
632002	Propeller Governor and Overspeed Governor - Inspect for oil leaks, condition and security.	121		
632003	Overspeed Governor - Inspect electrical connection wiring for evidence of damage and security.	121		

632004	Propeller Governor Operational check with engine running - Perform check.	ENG

TIME LIMITS / MAINTENANCE CHECKS

PROGRESSIVE CARE PROGRAM

INSPECTION OPERATION 2

ITEM CODE NUMBER	DESCRIPTION	ZONE	MECH	INSP REMARKS
633001	Hartzell Propeller Spinner - Remove, wash, inspect for cracks, fractures, condition and security.	110		
633002	Hartzell Spinner Bulkhead - Inspect for cracks, condition and security.	110		
633003	Hartzell Propeller Blades - Wash, check for nicks, gouges, scratches, corrosion, leading edge looseness, depressions, erosion, cracks, condition and security.	110		
633004	Hartzell Propeller Blades - Check alignment and freedom of movement.	110		
633005	Hartzell Propeller Hub (exposed area) - Inspect for cracks, wear, condition, and security of components to hub.	110		
633006	Hartzell Propeller - Inspect for oil and grease leaks.	110		
633007	Hartzell Propeller Mounting - Visually check for security of installation.	110		
633008	Hartzell Propeller Hub - Lubricate and check for security of blades. (Refer to Chapter 12 for type of lubrication, and Chapter 61 for specific lubrication instructions).	110		
632002	Propeller Governor and Overspeed Governor - Inspect for oil leaks, condition and security.	121		
632004	Propeller Governor Operational checks with engine running - Perform check.	ENG		

TIME LIMITS / MAINTENANCE CHECKS

PROGRESSIVE CARE PROGRAM

INSPECTION OPERATION 3

ITEM CODE NUMBER	DESCRIPTION	ZONE	MECH	INSP REMARKS
633001	Hartzell Propeller Spinner - Remove, wash, inspect for cracks, fractures, condition and security.	110		
633002	Hartzell Spinner Bulkhead - Inspect for cracks, condition and security.	110		
633003	Hartzell Propeller Blades - Wash, check for nicks, gouges, scratches, corrosion, leading edge looseness, depressions, erosion, cracks, condition and security.	110		
633004	Hartzell Propeller Blades - Check alignment and freedom of movement.	110		
633005	Hartzell Propeller Hub (exposed area) - Inspect for cracks, wear, condition, and security of components to hub.	110		
633006	Hartzell Propeller - Inspect for oil and grease leaks.	110		
633007	Hartzell Propeller Mounting - Visually check for security of installation.	110		
633008	Hartzell Propeller Hub - Lubricate and check for security of blades. (Refer to Chapter 12 for type of lubrication and Chapter 61 for specific lubrication instructions).	110		
632001	Hartzell Beta System Feedback Ring - Inspect ring for condition, warpage and security of installation. Inspect carbon brush for wear and evidence of damage. Inspect linkage for condition and security. (Refer to Chapter 61).	110		
632002	Propeller Governor and Overspeed Governor - Inspect for oil leaks, condition and security.	121		
632004	Propeller Governor Operational checks with engine running - Perform check.	ENG		

TIME LIMITS / MAINTENANCE CHECKS

PROGRESSIVE CARE PROGRAM

INSPECTION OPERATION 4

ITEM CODE NUMBER	DESCRIPTION	ZONE	MECH	INSP REMARKS
633001	Hartzell Propeller Spinner - Remove, wash, inspect for cracks, fractures, condition and security.	110		
633002	Hartzell Spinner Bulkhead - Inspect for cracks, condition and security.	110		
633003	Hartzell Propeller Blades - Wash, check for nicks, gouges, scratches, corrosion, leading edge looseness, depressions, erosion, cracks, condition and security.	110		
633004	Hartzell Propeller Blades - Check alignment and freedom of movement.	110		
633005	Hartzell Propeller Hub (exposed area) - Inspect for cracks, wear, condition, and security of components to hub.	110		
633006	Hartzell Propeller - Inspect for oil and grease leaks.	110		
633007	Hartzell Propeller Mounting - Visually check for security of installation.	110		
633008	Hartzell Propeller Hub - Lubricate and check for security of blades. (Refer to Chapter 12 for type of lubrication and Chapter 61 for specific lubrication instructions).	110		
632002	Propeller Governor and Overspeed Governor - Inspect for oil leaks, condition and security.	121		
632004	Propeller Governor Operational checks with engine running - Perform check.	ENG		

TIME LIMITS / MAINTENANCE CHECKS

SCHEDULED INSPECTION CHECKS

A. Hartzell HC-D4N-3R/D9511F(K) Propeller (Chapter 61)
   (1) Propeller Governor (operational check with engine running)
      (a) With prop control at MAX RPM, advance power lever until prop RPM stabilizes at 1900 RPM, ±10 RPM.
      (b) Reduce power to idle and place prop control at minimum RPM.
      (c) Advance power lever until prop RPM stabilizes at 1600 RPM, +0, or -50 RPM.
      (d) Reduce power to idle and return prop control to maximum RPM.

PROPELLER (HARTZELL) - SERVICING

1. General
   A. Access to propeller grease fittings is gained by removing propeller spinner. Refer to Chapter 61, Propeller (Hartzell) - Maintenance Practices.
   B. Refer to Propeller Owner's Manual 149 for lubrication requirements and procedures for this propeller.

ICE AND RAIN PROTECTION

CONTENTS

ICE AND RAIN PROTECTION

PROPELLER ANTI-ICE - MAINTENANCE PRACTICES

1. General

   A. Propeller anti-ice maintenance practices consist of propeller anti-ice boot removal / installation and electrical components removal / installation.

2. Propeller Anti-ice Boots (Hartzell HC-D4N-3R/D9511F(K) Propeller) Removal / Installation

   A. Remove Propeller Anti-ice Boots

      WARNING: CEMENT AND SOLVENT VAPORS ARE TOXIC AND EXTREMELY FLAMMABLE. USE ONLY IN A WELL VENTILATED AREA AWAY FROM SPARKS AND VAPORS. EXESS EXPOSURE COULD CAUSE INJURY OR DEATH. IF DIZZINESS OR NAUSEA OCCUR, OBTAIN FRESH AIR IMMEDIATELY. AVOID CONTACT WITH SKIN OR EYES. USE SOLVENT-RESISTANT GLOVES TO MINIMIZE SKIN EXPOSURE. USE SAFETY GLASSES TO MINIMIZE CHANCE OF EYE CONTACT. IF EYE CONTACT OCCURS, FLUSH EYES WITH WATER FOR 15 MINUTES AND SEE A PHYSICIAN. IF SKIN CONTACT OCCURS, WASH THOROUGHLY WITH SOAP AND WATER. IF SWALLOWED, DO NOT INDUCE VOMITING. SEE A PHYSICIAN IMMEDIATELY.

      (1) Ensure that airplane electrical power is off.
      (2) Remove all tie straps securing electrical leads to propeller and hub.
      (3) Remove the tie strap securing the two pin housing and disconnect two pin housing on the anti-ice boot leads.
      (4) To remove or loosen installed anti-ice boots, use Toluol to soften the cement line. Apply a minimum amount of this solvent to the cement line as tension is applied to peel back the boot. The removal should be slow enough to allow the solvent to undercut the cement so parts will not be damaged.

   B. Install Propeller Anti-ice Boots.
      (1) Clean propeller surface to be bonded with Methyl-Ethyl-Keytone, (MEK). For final cleaning, wipe solvent film off quickly with a clear, dry cloth before it has time to dry.
      (2) Draw a line on centerline of leading edge of propeller blade.
      (3) Position boot on propeller so bottom of boot lead tab is 1.0 inch, ±0.063 inch from propeller hub as shown in Figure 1. This should place the inboard edge of the boot close to the corner of the blade and blade knob.
      (4) Position boot centerline (boot centerline is indicated by embossed marks 3/8 inch long at each end of the boot on the breeze surface) over propeller leading edge centerline. These marks may be transferred to the boot side using a silver pencil.
      (5) Slide inboard end of boot centerline 0.7 inch toward the face of the prop and mark this location on the boot. This is shown in Figure 1.
      (6) Slide outboard end of boot centerline 0.7 inch toward the face of the prop and mark this location on the boot.

ICE AND RAIN PROTECTION

PROPELLER ANTI-ICE - MAINTENANCE PRACTICES

(7) Draw a line between two marks established in steps 5 and 6. This is the line to be used to center boot on the propeller leading edge centerline.
(8) Mask off an area ½ inch from each side and outer end of boot and remove boot.

NOTE: The anti-ice boot lead tab is also to be bonded to the blade knob and requires extra attention in fitting the boot to align the lead tab correctly with the blade knob.

(9) Mix EC-1300L cement (Minnesota Mining & Mfg. Co.) thoroughly. Surfaces shall be above 60°F prior to applying cement. During periods of high humidity, care shall be taken to prevent moisture condensation due to cooling effect of evaporating solvent. Warming the area with a heat gun or heat lamp can do this. Apply one even brush coat of EC-1300L cement to cleaned surface. Allow to air dry for a minimum of one hour, then apply a second even brush coat.
(10) Moisten a clean cloth with MEK and clean bond surface of boot, changing cloths frequently to avoid contamination of cleaned area.
(11) Apply one even coat of EC-1300L cement to bond surface of boot. It is not necessary to cement more than half of bootstrap.
(12) Using a silver colored pencil, mark a centerline along leading edge of propeller blade and a corresponding centerline on cemented bond surface of boot.
(13) Reactivate surface of cement using a clean, lint-free cloth, heavily moistened with Toluol. Avoid excessive rubbing of cement, which would remove cement.
(14) Position boot centerline established on step 7, starting at hub end, to the propeller leading edge centerline. Tack boot centerline to propeller centerline. If boot is allowed to get off center, pull up with a quick motion and replace properly being careful not the damage the boot lead tab. Roll firmly along centerline with a rubber roller.
(15) Gradually tilting roller, work boot carefully over either side of blade contour to avoid trapping air in pockets.
(16) Roll outwardly from centerline to edges. If excess material at edges tends to form wrinkles, work them out smoothly and carefully with fingers.
(17) Apply one even coat of EC-539 (Minnesota Mining & Mfg. Co.), mixed per manufacturers instructions, around edges of installed boot.
(18) Remove masking tape from propeller and clean surface of propeller by wiping with a clean cloth dampened with Toluol.
(19) Test anti-ice boots for continuity by using an ohmmeter. Connect leads from ohmmeter to anti-ice boot wire connector terminal. There should be a reading between 3.4 and 3.7 ohms.

ICE AND RAIN PROTECTION

PROPELLER ANTI-ICE - MAINTENANCE PRACTICES

(20) Install electrical connectors, wire harness leads, and tie-straps in the following order.

(a) Route slip ring wire leads through hole in counterweight as shown in Figure 2.

(b) Connect anti-ice boot wire connector (3) to slip ring wire connector (8).

(c) Install small tie-strap (7) between leads and around assembled connector. (Do not tighten).

(d) Install second small tie-strap (4) securing slip ring wire leads to counterweight. (Do not tighten).

(e) Install two medium tie-straps (5) & (6) through the small tie-wrap in step (c) securing connector assembly to counterweight in two locations. (Do not tighten).

(f) Position connector assembly on counterweight to eliminate slack in anti-ice boot leads.

(g) Verify enough slack exists between counterweight and back of slip ring to allow all blade angles.

(h) Tighten all tie-straps.

ICE AND RAIN PROTECTION

PROPELLER ANTI-ICE - MAINTENANCE PRACTICES

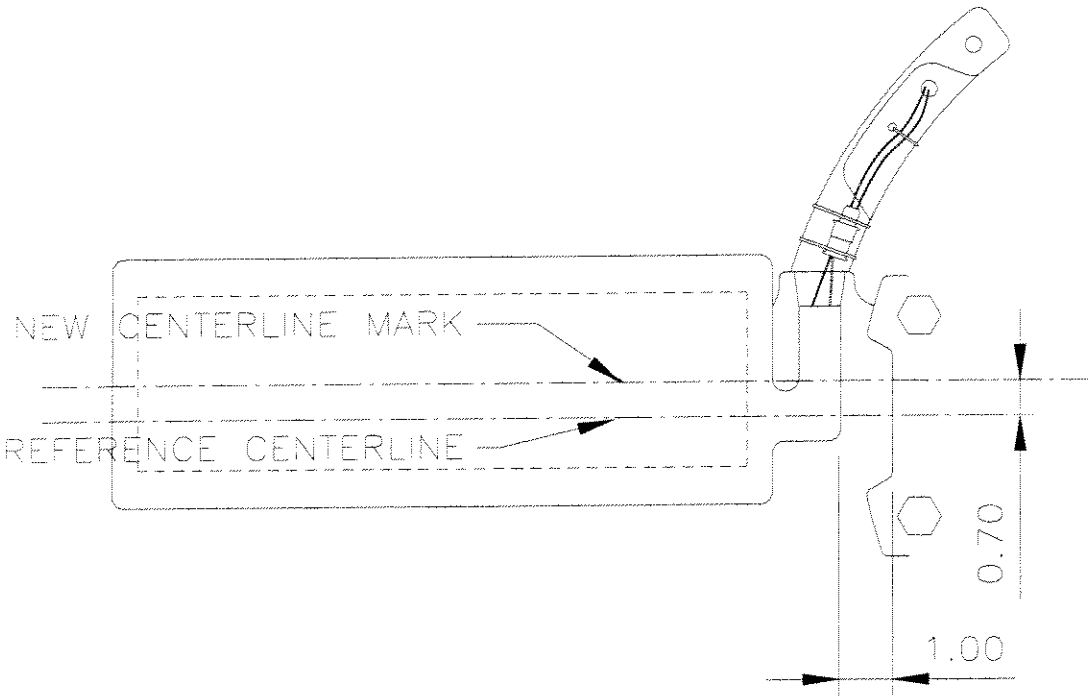

Figure 1 – Anti-Ice Boot Installation

ICE AND RAIN PROTECTION

PROPELLER ANTI-ICE - MAINTENANCE PRACTICES

1. Anti-ice boot
2. Propeller Hub
3. Anti-ice boot wire connector
4. Small tie-strap
5. Medium tie-strap
6. Medium tie-strap
7. Small tie-strap
8. Slip ring wire connector

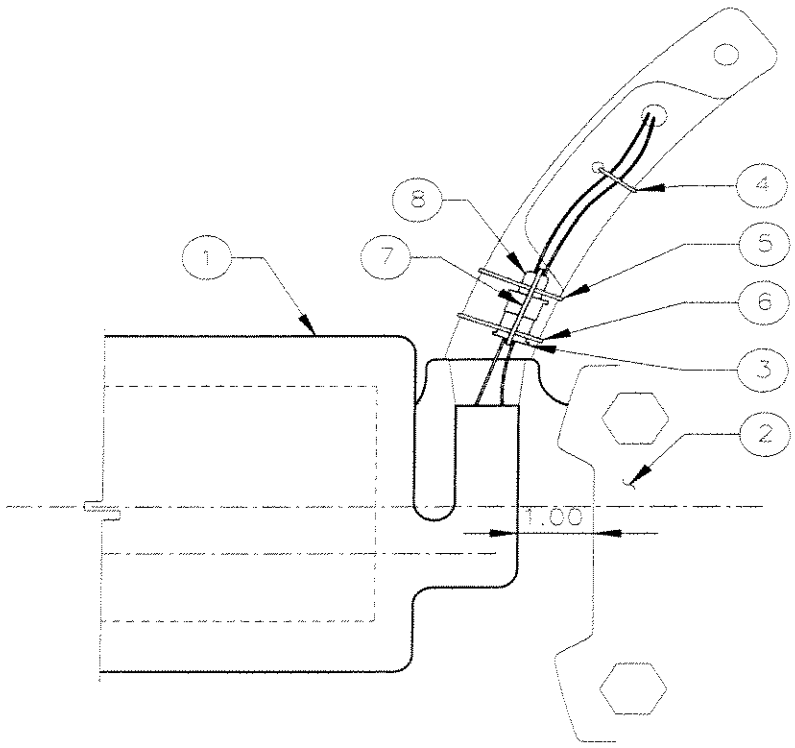

Figure 2 – Anti-Ice Boot Installation

ICE AND RAIN PROTECTION

PROPELLER ANTI-ICE - MAINTENANCE PRACTICES

3. Slip Ring Assembly (Hartzell HC-D4N-3R/D9511F(K) Propeller) Removal/Rework/Installation

   A. Remove Slip Ring Assembly.
      (1) Ensure that airplane electrical power is off.
      (2) Remove propeller.
      (3) Tag and remove electrical wires from the four terminal strips on spinner bulkhead.
      (4) Remove and retain screws securing slip ring to spinner bulkhead.
      (5) Remove slip ring carefully working electrical leads through holes in spinner bulkhead.

   B. Rework Slip Ring Assembly.

      Refer to the latest revision of the Installation and Maintenance Manual for Electrothermal Propeller De-Icing Systems (BFGoodrich Report 68-04-712) for slip ring rework information.

   C. Install Slip Ring Assembly.
      (1) Insert slip ring electrical leads through holes in spinner bulkhead and align screw holes.
      (2) Install screws.
      (3) Install propeller.

      NOTE: Before proceeding with slip ring installation, the following slip ring alignment must be accomplished.

4. Slip Ring Alignment Check (Hartzell HC-D4N-3R/D9511F(K) Propeller)

   A. Check Slip Ring Alignment.

      CAUTION: Excessive slip ring runout will result in severe arcing between slip ring and brushes, and cause rapid brush wear. If allowed to continue, this condition will result in rapid deterioration of slip ring and brush contact surfaces, and lead to eventual failure of propeller de-icing system.

      Refer to the latest revision of the Installation and Maintenance Manual for Electrothermal Propeller De-Icing Systems (BFGoodrich Report 68-04-712) for slip ring rework information.

ICE AND RAIN PROTECTION

PROPELLER ANTI-ICE - MAINTENANCE PRACTICES

5. Brush Length Inspection (Hartzell HC-D4N-3R/D9511F(K) Propeller)

   A. Inspect Brush Length.

      NOTE: Inspect brushes and clean slip ring in accordance with Inspection Time Limits set forth in Chapter 5.

      (1) Ensure that airplane electrical power is off.
      (2) Remove right nose cap half.
      (3) Remove washers and nuts securing brush block assembly bracket to engine.
      (4) Position brushes so that ends of brushes extend 0.0625 inch from brush block assembly module.
      (5) Place marks on a straightened paper clip 0.36 inch from end, and 1.39 inches from end.
      (6) Position paper clip through slot in brush block bracket and into hole in brush block assembly module.

         NOTE: The brushes may or may not be equipped with rods.

      (7) Observe appropriate mark on paper clip, 0.36 inch mark (with rods) or 1.39 inch mark (without rods). If appropriate mark disappears into brush block assembly module, brush block assembly module must be replaced.

6. Brush Block Assembly Removal / Installation (Hartzell HC-D4N-3R/D9511F(K) Propeller)

   A. Remove Brush Block Assembly.
      (1) Ensure that airplane electrical power is off.
      (2) Tag to identify and disconnect electrical wires from brush block assembly.
      (3) Remove screws, washers, and nuts securing brush block assembly to mount.
      (4) Remove shim between brush block assembly and mount. Remove brush block assembly from airplane.

   B. Install Brush Block Assembly.

      NOTE: Before proceeding with brush block installation, ensure that brush block alignment has been accomplished.

      (1) Ensure that airplane electrical power is off.
      (2) Insert shim between brush block assembly and mount, then install screws, washers, and nuts.

ICE AND RAIN PROTECTION

PROPELLER ANTI-ICE - MAINTENANCE PRACTICES

7. Brush Block Assembly to Slip Ring Alignment (Hartzell HC-D4N-3R/D9511F(K) Propeller)

CAUTION: Ensure that slip ring alignment has been accomplished before attempting to align brushes on slip ring.

A. Align Brush Block Assembly to Slip Ring Attachment.

NOTE: Keep brushes retracted in brush block until slip ring and propeller assemblies have been installed. In order to get smooth, efficient and quiet transfer of electrical power from brushes to slip ring, brush alignment must be checked and adjusted, to meet the following requirements.

(1) The clearance between brush block and slip ring is to be between 0.031 and 0.094 inches.
(2) The brushes are to be lined up with slip ring so that entire face of each brush is in contact with slip ring throughout the full 360 degrees of slip ring rotation.
(3) The brushes must contact slip ring at an angle of 2 degrees from perpendicular to slip ring surface, measured toward the direction of rotation of slip ring.
(4) Brush projection can be adjusted by loosening hardware attaching the brush block and holding the brushes in desired location while retightening hardware. Slotted holes are provided.
(5) To center brushes on slip ring, a shim made of a series of laminates is provided and may be peeled for proper alignment. Layers of metal 0.003 inch are used to make up shims, which are approximately 0.20 thick overall. Shims may also be fabricated locally.

8. Propeller Anti-Ice Timer Removal/Installation

Refer to basic Maintenance Manual for removal and installation information.

ICE AND RAIN PROTECTION

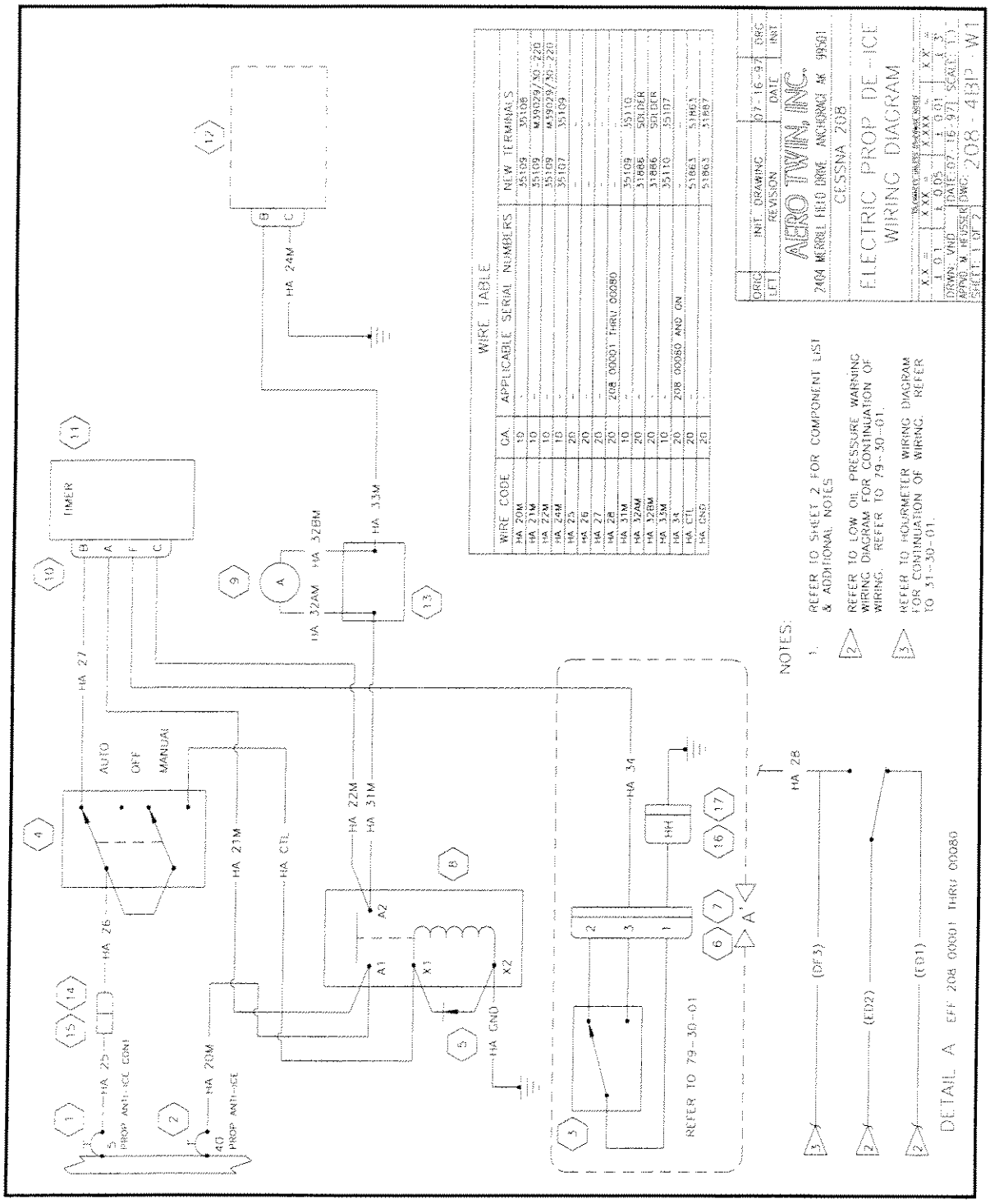

Figure 1 – Wiring Diagram – Electric Prop Anti-ice

ICE AND RAIN PROTECTION

WIRING DIAGRAM – ELECTRIC PROP ANTI-ICE

FIGURE ITEM	PART NUMBER	NOMECLATURE	SOURCE / SPECIFICATION	EFFECT FROM TO	UNIT PER ASSY
1	S-1232-505	CIRCUIT BREAKER, 5 AMP	CESSNA	ALL	1
2	S-1232-540	CIRCUIT BREAKER, 40 AMP	CESSNA	ALL	1
3	9910287	PRESSURE SWITCH	CESSNA	ALL	1
4	MS25307-312	SWITCH	CESSNA	ALL	1
5	1N4004	DIODE	ANY AVIATION SOURCE	ALL	1
6	S-1638-1	CONNECTOR	CESSNA	ALL	1
7	S-1638-2	CONNECTOR	CESSNA	ALL	1
8	MS24140-D1	RELAY	MS SOURCE / MIL-R-6106	ALL	1
9	3E1872-4	PROP DE-ICE GAUGE	BFGOODRICH	ALL	1
10	MS3456W20-22S	CONNECTOR	ANY AN/MS SOURCE	ALL	1
11	3E2205-4	TIMER	BFGOODRICH	ALL	1
12	3E2090-1	BRUSH BLOCK ASSY	BFGOODRICH	ALL	1
13	MS91586-2	SHUNT	ANY AN/MS SOURCE	ALL	1
14	200513-2	CONNECTOR	CESSNA	ALL	1
15	S-2096-1	CONNECTOR	CESSNA	ALL	1
16	S-2527-1	CONNECTOR	CESSNA	ALL	1
17	S-2527-2	GROUND BLOCK	CESSNA	ALL	1

NOTES:

(1) Wire to conform to M22759/16 or equivalent.
(2) Terminals to conform to MIL-T-7928 or equivalent.
(3) MOV Varistor part number 2670069 to be removed and discarded.
(4) Diode leads to be insulated using Teflon insulating tubing, part number TTI-S22 or equivalent.
(5) Reference Cessna drawing number 2671000, Electric Prop De-ice, for original system configuration information.
(6) All switches shown in auto position.
(7) Wiring to be accomplished IAW AC43.13-1A/2A.
(8) 208 serial numbers 0001 to 0179 and B0001 to B0209 aircraft were originally equipped with two 30 AMP "STBY PWR" circuit breakers and must be replaced with two 40 AMP circuit breakers IAW wiring diagram – Standby Alternator, 24-31-00 Figure 1, Dated August 1, 1995 or later revision.
(9) Installing Agency may use wire numbers other than those indicated on Figure 1.

PROPELLER

CONTENTS

PROPELLER

DESCRIPTION AND OPERATION

1. General

   A. The Hartzell propeller installation consists of a Hartzell Model HC-D4N-3R/D9511F(K) four-bladed, constant-speed, full-feathering, reversible, governor-regulated propeller equipped with aluminum blades. A propeller control lever on the control quadrant in the cockpit establishes a setting in the propeller governor through a linkage to the engine compartment. This setting (of the governor pilot valve) establishes propeller speed by balancing governor-boosted oil pressure/flow against a servo piston in the propeller hub with the action of return springs in the hub and centrifugal counter-weights on the blade shanks acting to drive the servo piston in the opposite direction. Since the servo piston is linked to the blades, its position thus governs their setting or blade angle and hence determines propeller speed. Increasing oil pressure against the piston drives the blades toward low pitch (high RPM) and into reverse while the return springs and the counterweights acting against the piston, drives the blades toward high pitch (low RPM) and into feather. The source of propeller system oil is the engine pressure lubrication system boosted to a higher pressure by the propeller governor gear pump.

2. Description

   A. The propeller assembly consists of a hollow steel spider hub, which supports four propeller blades, and also houses an internal oil pilot tube and feather return springs. A hydraulic piston mounted at the front of the propeller spider hub controls movement of propeller blades. The servo piston is connected by a link to the trailing edge root of each blade. Centrifugal counterweights on each blade and feathering springs in servo piston tend to drive servo piston into the feather or high pitch position. The propeller governor oil pressure opposes this movement. The governor oil pressure is applied to servo piston via passages in governor body, an oil transfer tube, and oil transfer housing on propeller shaft, and via the hollow centerbore of propeller shaft and propeller hub. An increase in governor oil pressure moves blades toward low pitch position (increased RPM). A decrease in governor oil pressure allows the blades to move toward high pitch position (decreased RPM) under the influence of feathering springs and blade counterweights.

   B. The servo piston is also connected by four spring-loaded sliding rods to a feedback ring mounted at rear of propeller. A carbon block transmits movement of feedback ring through the propeller-reversing lever to Beta valve on propeller governor. This movement is used to control propeller blade angle from the normal forward low pitch stop to full reverse position.

PROPELLER

PROPELLER - MAINTENANCE PRACTICES

1. General

   A. Maintenance practices for the propeller consist of removal, installation, and adjustment / checks. Adjustment/checks include the following: feather blade angle check and adjustment, low pitch stop check and adjustment, and propeller hub lubrication.

2. Propeller Removal / Installation

   A. Remove Propeller.
      (1) Consult the Hartzell Propeller Owner's Manual Number 149 for specific instructions on the removal of the propeller.

   B. Install Propeller.
      (1) Consult the Hartzell Propeller Owner's Manual Number 149 for specific instructions on the installation of the propeller.

3. Adjustment / Checks

   A. Beta Feedback Ring Axial Runout Check.
      (1) Consult the Hartzell Propeller Overhaul Manual Number 143 for specific instructions on the Beta Feedback Ring Axial Runout Check.

   B. Feather Blade Angle Check and Adjustment.
      (1) Consult the Hartzell Propeller Overhaul Manual Number 143 for specific instructions on the pitch control adjustments.

   C. Low Pitch Stop Check and Adjustment
      (1) Consult the Hartzell Propeller Overhaul Manual Number 143 for specific instructions on the pitch control adjustments.

   D. Propeller Hub Lubrication
      (1) Consult the Hartzell Propeller Owner's Manual Number 149 for specific instructions on the lubrication requirements and procedures.

PROPELLER

DYNAMIC BALANCING - ADJUSTMENT / TEST

1. General

Refer to the latest revision of Hartzell Manual 202( ) for general information regarding dynamic balancing of the Hartzell HC-D4N-3R/D9511F(K).

4. Power Lever Reverse Gas Generator (Ng) Pickup Adjustment

A. Adjust Power Lever Control Reverse Gas Generator (Ng) Pickup (Refer to Figure 503).

(1) Start engine, observing all operating limitations. Refer to Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.

(2) Operate engine at IDLE for five minutes, allowing temperatures to stabilize.

(3) Place propeller speed control lever in MAX forward position.

(4) Move power control lever from IDLE, then slowly aft to REVERSE position.

(a) Verify propeller RPM increases to peak, then decreases 10 RPM to 15 RPM before gas generator (Ng) begins increasing from idle. Adjust control lever reverse gas generator (Ng) pickup as required.

1 Cut and remove safety wire on reverse gas generator pickup screw.

2 Using an Allen key, hold pickup screw securely to prevent movement and release torque on nut.

3 Rotate reverse generator pickup screw clockwise or counterclockwise in increments of one-eighth turn to achieve a minimum torque of 600 foot-pounds at MAX REVERSE.

CAUTION: REVERSE GENERATOR PICKUP SCREW ADJUSTMENT IS SENSITIVE AND SHALL BE ADJUSTED IN INCREMENTS OF ONE-EIGHTH TURN BETWEEN ADJUSTMENTS.

4 Torque jam nut and safety wire

(b) Shut down engine. Refer to Pilot's Operating Handbook and FAA Approved Airplane Flight Manual.