ICA_020215

STC SA04045CH

INSTRUCTIONS FOR CONTINUED AIRWORTHINESS FOR THE HARTZELL 5D3-N338A1/78D01B PROPELLER ON PIPER PA-46-500TP AIRCRAFT

LOG OF REVISIONS

Revision	Revised Page(s)	Description of Revision	Engineer	Date
New	All	Original Release	D. Glaser	9/18/2015

ICA_020215

STC SA04045CH

INSTRUCTIONS FOR CONTINUED AIRWORTHINESS
FOR THE
HARTZELL 5D3-N338A1/78D01B PROPELLER
ON PIPER PA-46-500TP AIRCRAFT

INTRODUCTION

These Instructions for Continued Airworthiness contain the unique maintenance requirements and procedures associated with the Hartzell 5D3-N338A1/78D01B five-blade, composite propeller installed on Piper PA-46-500TP aircraft. These instructions only address issues specific to this propeller. For all other information, refer to the PA-46-500TP Aircraft Maintenance Manual.

Chapter 4 – AIRWORTHINESS LIMITATIONS

> **NOTE**: The Airworthiness Limitations section is FAA approved and specifies maintenance required under 14 CFR §43.16 and §91.403 unless an alternative program has been FAA approved.

There are no new or additional airworthiness limitations associated with this equipment and/or installation.

Chapter 5 - TIME LIMITS / MAINTENANCE CHECKS

All required maintenance, inspections, time intervals, and procedures for this Hartzell Propeller is found in Hartzell Manual 486 (Hartzell Propeller Owner's Manual) provided with each propeller. Recommended Time-Between-Overhaul (TBO) for the STC propeller is also provided in Hartzell Service Letter HC-SL-61-61Y. Propeller overhaul must be accomplished by a certified propeller repair station with the appropriate rating.

All propeller inspection requirements contained in Phase, Special, Biennial, Interim, Complete and Unscheduled inspections remain unchanged and should be complied with as provided in Chapter 5 of the applicable PA-46-500TP Maintenance Manual. Procedures unique to the composite blade construction are provided in the Maintenance Practices section of Hartzell Manual 486 (Hartzell Propeller Owner's Manual).

Due to the composite construction of the propeller blades, in the event of a lightning strike, in addition to the lightning strike inspection criteria provided in the Piper PA-46-500TP Maintenance Manual, refer to Hartzell Propeller Owner's Manual 486, Chapter 5, Special Inspections - Lightning Strike, for detailed information on propeller lightning strike inspection and disposition.

ICA_020215

STC SA04045CH

INSTRUCTIONS FOR CONTINUED AIRWORTHINESS
FOR THE
HARTZELL 5D3-N338A1/78D01B PROPELLER
ON PIPER PA-46-500TP AIRCRAFT

Chapter 30 ICE AND RAIN PROTECTION

Propeller De-Ice System – Description and Operation

The Hartzell 5D3-N338A1/78D01B propeller uses a dual zone heating element de-ice boot that is functionally equivalent to the de-ice boot installed on the Hartzell four-blade propeller de-ice system described in the Piper PA-46-500TP Aircraft Maintenance Manual. Like the four-blade propeller, the five-blade propeller de-ice design heats the outboard boot section of all blades simultaneously, then alternates to the inboard section, based on the propeller de-ice timer mode, as described below:

Mode Number	Timer Function
Ground Mode	The outboard section of all five blades is heated for 30 seconds. Then the inboard section of all five blades is heated for 30 seconds. After one minute of total operation, the system turns off.
Flight Mode	The outboard section of all five blades is heated for 90 seconds and then the inboard section of all five blades is heated for 90 seconds. The cycle then repeats.

New brush block brackets, brush block assemblies and a Metal Oxide Varistor (MOV) assembly are installed to accommodate the five-blade propeller de-ice system. All other propeller de-ice system components and system functionality remain unchanged and the system description provided in the Piper Aircraft Maintenance Manual is applicable.

There is one operational **CAUTION** that must be observed to prevent damage to the composite blades. Without the engine running and the propeller turning, avoid operating the propeller de-ice system for more than 10 seconds. If the propeller de-ice system is operated for more than 10 seconds without the engine running, the de-ice boot can heat the blade to temperatures that will damage the composite blade. The following caution is provided in the STC Installation Instructions and Airplane Flight Manual Supplement:

CAUTION

OPERATION OF THE PROPELLER DE-ICE SYSTEM WITHOUT THE ENGINE RUNNING IS LIMITED TO 10 SECONDS OR SEVERE DAMAGE TO THE COMPOSITE BLADES MAY RESULT. IF 10 SECONDS IS EXCEEDED, CONTACT HARTZELL PRODUCT SUPPORT AT:

Phone: (937) 778-4379 or 1-800-942-7767
e-mail: techsupport@hartzellprop.com

ICA_020215

STC SA04045CH

INSTRUCTIONS FOR CONTINUED AIRWORTHINESS
FOR THE
HARTZELL 5D3-N338A1/78D01B PROPELLER
ON PIPER PA-46-500TP AIRCRAFT

Propeller De-Ice System – Inspection/Check

Except for the system test and the caution requirements contained in this document, the inspection procedures provided in the PA-46-500TP Aircraft Maintenance Manual are applicable to the five-blade propeller.

Additional troubleshooting, maintenance, and inspection procedures are available. For propeller mounted de-ice system components, refer to Hartzell Manuals 180, 181, and 182. For the airframe mounted (non-rotating) system components, refer to the applicable Piper PA-46-500TP Maintenance Manuals and the STC Installation Instructions (Inst_020215).

Unless otherwise noted, definition and maintenance of propeller-mounted de-ice system components are provided in the Hartzell Manuals listed below:

Manual 180 – Propeller Ice Protection System Manual
Refer to "De-Ice Kits for Lightweight Turbine Propellers with Composite Blades" to see Illustrated Parts Lists for Propeller De-Ice Kit P/N 106285

Manual 181 – Propeller Ice Protection System Component Maintenance Manual

Manual 182 – Propeller Electrical De-Ice Boot Removal and Installation Manual.

These manuals can be viewed and/or obtained via the internet on the Hartzell Propeller website (www.hartzellprop.com). The manuals are located in the "Service & Support" section under Services/Reference Library/Manuals/Ice Protection Manuals.

The MOV module does not require troubleshooting because it is a passive component that is only replaced in the event of a lightning strike.

The latest revisions of the propeller de-ice installation drawings 106285, 106293, 106337, and 106342 may be referenced to aid in troubleshooting.

Propeller De-Ice System – Adjustment/Test

1. **General**

This section gives application specific test procedures to perform:

- An operational ramp check test of the propeller de-ice system (after propeller installation and for normal maintenance checks)

ICA_020215

STC SA04045CH

INSTRUCTIONS FOR CONTINUED AIRWORTHINESS
FOR THE
HARTZELL 5D3-N338A1/78D01B PROPELLER
ON PIPER PA-46-500TP AIRCRAFT

- A functional test of the propeller de-ice system (to aid troubleshooting when in-depth procedures are necessary)

  Note: The following procedures cover multiple aircraft models with different avionics systems. Generic terms apply with respect to operation faults from the de-ice annunciation system.

The propeller de-ice system operates similarly for all systems with similar fault indications.

2. **Operational Test of Propeller Deicing System**

This test is an operational ground test of the propeller de-ice system and may be performed by one person in the cockpit of the aircraft.

CAUTION
OPERATION OF THE PROPELLER DE-ICE SYSTEM WITHOUT THE ENGINE RUNNING IS LIMITED TO 10 SECONDS OR SEVERE DAMAGE TO THE COMPOSITE BLADES MAY RESULT.

2.1. Assure the area around the propeller is clear of objects.

2.2. Lock brakes, start engine and operate at 2000 RPM (Np).

2.3. Turn generator on, and then activate PROP HEAT switch to ON position.

2.4. a) For Non-G1000 equiped Aircfraft: Observe and verify the amber PROP HEAT ON annunciator illuminates steady for 30 seconds indicating the propeller heat is functioning properly on the outboard (1^{st}) cycle. After 30 seconds, observe the amber PROP HEAT ON flashes for 30 seconds, indicating the propeller heat is functioning properly on the inboard (2^{nd}) cycle. At the end of the second cycle (1 minute), the control module will automatically switch off the PROP HEAT and the annunciator will no longer illuminate until the aircraft leaves the ground or the pilot cycles the PROP HEAT switch on the overhead panel.

b) For G1000 equipped Aircraft: Observe display for one minute, confirm no PROP HEAT FAIL caution message is displayed.

2.5. Test PROP HEAT FAIL annunciation by cycling the PROP HEAT switch (off to on), then pull out the PROP HEAT circuit breaker. System should annunciate PROP HEAT FAIL on the applicable CAS panel for non-G1000 systems or the display panel for G1000 equipped systems.

ICA_020215

STC SA04045CH

INSTRUCTIONS FOR CONTINUED AIRWORTHINESS
FOR THE
HARTZELL 5D3-N338A1/78D01B PROPELLER
ON PIPER PA-46-500TP AIRCRAFT

3. **Functional Test of Propeller Deicing System (engine off)**

CAUTION

OPERATION OF THE PROPELLER DE-ICE SYSTEM WITHOUT THE ENGINE RUNNING IS LIMITED TO 10 SECONDS OR SEVERE DAMAGE TO THE COMPOSITE BLADES MAY RESULT.

CAUTION

Two people must do this procedure: one person in the cockpit and one person at the propeller. During testing, the person at the propeller must turn the propeller slowly and continuously. If the propeller is not turned continuously, the temperature between the brush block and slip ring assemblies can increase and cause damage to equipment.

NOTE

Though not required, it is highly recommended that external power be connected to the aircraft for the following procedure to conserve the aircraft battery. Low voltage conditions may have adverse effects on the aircraft annunciation systems.

3.1. Assure the area around the propeller is clear of objects and that the aircraft is on the ground (weight on wheels).

3.2. Remove lower and upper cowling to access de-ice wiring, brush blocks, and slip ring. Refer to the applicable Aircraft Maintenance Manual for procedure.

3.3. Energize the aircraft electrical system. Refer to the applicable Aircraft Maintenance Manual procedure.

3.4. While turning the propeller by hand, turn on propeller de-ice switch. Observe the 10 second activation limit.

3.5. By hand, feel for heat on the OUTBOARD section (1st Cycle) of all five de-ice boots.

3.6. Return the propeller de-ice switch to the off position and de-energize the aircraft electrical system.

3.7. Disconnect the outboard airframe power lead from the primary brush block wire “A”. (The primary brush block is the one co-located with the MOV.) Temporarily cap and stow wire and terminal. Temporarily secure brush lead and screw terminal.

3.8. Re-energize the aircraft electrical system. Refer to the applicable Aircraft Maintenance Manual procedure.

3.9. While turning the propeller by hand, turn on propeller de-ice switch and allow 30 seconds for the control module to cycle through the OUTBOARD (1st cycle) mode. PROP HEAT FAIL annunciation should illuminate and latch for the remainder of this test.

CAUTION

During this time, no heat should be felt in the OUTBOARD section of the de-ice boot. If heat is felt in the outboard section, OR the PROP HEAT FAIL annunciation does not come on, turn de-ice off and go back to step 3.7.

3.10. After 30 seconds, by hand, feel for heat on the INBOARD section of all five de-ice boots. Observe the 10 second activation limit.

3.11. Return the propeller deice switch to the off position and de-energize the aircraft electrical system.

3.12. After successful completion of testing, reconnect power lead to the primary brush block wire “A”.

3.13. Reinstall upper and lower cowling; refer to the applicable Aircraft Maintenance Manual for procedure.

Brush Blocks and MOV – Removal/Installation

The brush blocks and MOV installation for the five-blade propeller is similar to the original four-blade propeller except that the primary brush block bracket accommodates the MOV assembly and the associated harness. The brush block brackets removal and installation procedures provided in the PA-46-500TP Aircraft Maintenance Manual apply, except for part numbers, brush block shim, and MOV connection details. Refer to Hartzell Airframe Installation Drawing 106342, de-ice kit drawing 106337, and Installation Instructions INST_020215 for brush block and MOV installation details.

The MOV module is installed on a revised design bracket at the same location as the original primary brush block bracket assembly (on the right side of the engine). The MOV is for the propeller de-ice system lightning protection. Hartzell recommends the MOV be replaced in the event of a lightning strike per Hartzell Manuals 181 and 486. Refer to Hartzell airframe de-ice

kit P/N 106337, Airframe Installation Drawing 106342, and installation instructions INST_020215 for MOV installation details.

De-ice Boot Removal and Installation

See latest revision of Hartzell Manual 182, Propeller Electrical De-ice Boot Removal and Installation Manual.

Propeller Ice Protection System Manual

See latest revision of Hartzell Manual 180, Propeller Ice Protection System Manual for additional Ice Protection System component details.

Propeller Ice Protection System Component Maintenance Manual

See latest revision of Hartzell Manual 181, Propeller Ice Protection System Component Maintenance Manual for additional Ice Protection System Component Maintenance details.

Chapter 61 - PROPELLERS

Propeller – Description and Operation

The STC propeller is an 82.5" diameter, five-blade, constant-speed, feathering, and reversing propeller. For additional information, refer to the "Description and Operation" section of Hartzell Manual 486 (Hartzell Propeller Owner's Manual) for "Raptor Turbine Propeller Series with Composite Blades. Models: (_)D3-(_)(_)(_)"

Propeller – Adjustment/Test

The dynamic balancing procedures provided in the PA-46-500TP Aircraft Maintenance Manual are applicable to the composite, five-blade propeller.

Propeller Blades – Repair

All required maintenance, inspections, time intervals, and procedures are provided or referenced in Hartzell Manual 486 (Hartzell Propeller Owner's Manual), provided with each propeller.

ICA_020215

STC SA04045CH

INSTRUCTIONS FOR CONTINUED AIRWORTHINESS
FOR THE
HARTZELL 5D3-N338A1/78D01B PROPELLER
ON PIPER PA-46-500TP AIRCRAFT

Recommended Time-Between-Overhaul (TBO) limits for this propeller are provided in Hartzell Service Letter HC-SL-61-61Y. Propeller overhaul must be accomplished by a certified propeller repair station with the appropriate rating.

Propeller – Removal/Installation

The STC propeller is installed in accordance with STC Installation Instructions INST_020215. Installation and removal details are provided in Hartzell Manual 486 (Hartzell Propeller Owner's Manual) for "Raptor Turbine Propeller Series with Composite Blades. Models: (_)D3-(_)(_)(_)"

Spinner Inspection/Maintenance

Refer to Hartzell Manual 127 for 105951(_) aluminum spinner assembly inspection and maintenance information.

For Product Support contact:

Address: Hartzell Propeller Inc.
One Propeller Place
Piqua, Ohio 45356-2634
USA

Phone: (937) 778-4379 or
1-800-942-7767

E-mail: techsupport@hartzellprop.com

Internet: www.hartzellprop.com