COLD WEATHER MODIFICATION

INSTRUCTIONS FOR CONTINUED AIRWORTHINESS

Document No: TCA0004 Rev. E
Dated: SEP-06-2017

FOR

TURBINE ENGINE

PREHEAT / PRECONDITION KIT

Aircraft Registration No._____ Serial No._____

Attach this document to applicable Approved Maintenance Manual (MM).
Supporting installation information retained and recorded as noted in Section (§) 2.
Information in this manual supplements Original Equipment MM only in those areas listed.

RECORD OF REVISIONS

When updated, this document is changed in its entirety.

REV	DATE	DESCRIPTION	BY	RELEASE
E	SEP-06-2017	Define Inspection and Maintenance Intervals § 4.	DNE	Dirk N. Ellis
D	JUN-04-2015	Update Tables Section 16.	DNE	DNE
C	JUN-06-2014	Reformat, add Tables and Figures.	DNE	DNE

CONTENTS

1. PURPOSE

Purpose of this ICA is to aid the operator in creating an acceptable maintenance program for the preheat system installed on the aircraft and engine(s). One that complies with standard aviation processes and airframe/engine manufacturer's recommendations. This document contains necessary information to aid in this process, and to perform required inspection and maintenance procedures.

2. RECORD OF REVISIONS

It is the responsibility of the user of this document to verify the latest document revisions are used and any maintenance and/or modifications associated with kit are recorded and tracked.

Current document revisions available through www.TanisAircraft.com or by contacting Tanis Aircraft Products: 952-224-4425.

At time of initial installation:

- Documents associated with installed kit(s) are to be retained and recorded in Table 1.
- Installed system and elements values are recorded in Table 2.

3. AIRWORTHINESS LIMITATIONS

System does not change Airworthiness Limitations. Airworthiness Limitations section of the FAA specifies inspections and other maintenance required under Title 14 of The Code of Federal Regulations (14 CFR) Sections (§) 43.16 and 91.403, unless an alternative program has been FAA approved.

4. INSPECTION AND MAINTENANCE INTERVALS

Visual Inspection and Functional System Check required, minimum one (1) per 12-month cycle, or equivalently scheduled inspection. Seasonal check recommended prior to winter season.

Inspections are the only form of scheduled maintenance required under normal flight conditions and operations. Maintenance and repairs are to be carried out in response to operational concerns and/or inspection discrepancies. Unless an alternative program has been approved Inspections and/or Maintenance shall be recorded under 14 CFR Part 43.9.

- Repairs shall conform to applicable standards and be conducted by an appropriately rated and certified technician or maintenance/repair facility.
- Reference, AC 43.13-1 (as amended), Chapter 11 Sections 1, 3, 4, and 8, applicable Cable Kit Wire Diagram, and Tables 1 and 2 of this document.
- Troubleshooting - Reference § 15.

4.1 Visual Inspection

1. Cable Assembly - Inspect shore power plug and follow cable leads to components inspecting wire/cables, connectors, and junctions, for signs of fatigue, chafing, vibration, flexing, heat damage, and/or deformities. Repair and/or secure as needed.
2. Pad Heat Elements - Inspect elements for security of attachment, and bonding. Should any portion of the pad heat element come loose it may be re-bonded or replaced. Inspect elements for signs of, oil damage, developing areas of gray/yellow, abrasion, or exposed heating wire. These are signs indicating a pad has failed or is in the process of failing due to poor contact with the substrate or abrasion, and need replacement.

4.2 Functional System Check

⚠ Caution: Energized elements can cause 2nd and 3rd degree burns.

* Reference Figure 1.

** Skip when not installed or test separately.

1. Using ohmmeter verify circuit is closed between plug ground contact, 3* and airframe.
2. Using ohmmeter measure and record resistance between plug contacts 1 and 2*. Record resistance for annual and/or future comparisons:_____
3. Plug system into appropriate power source, verify red indicator light is on (illuminated). In about 30-minutes area next to each element should feel warm.
4. ** While system is warming up freeze (0°C) battery thermal control then test battery heat element for heat. Battery heat element can be touched, as wattage density is low.
5. ** Verify AV heater operation by checking for audible fan and warm air circulation.

5. DESCRIPTION

Preconditioning, commonly referred to as preheating, is performed while on the ground prior to flight while in standby status. This kit preconditions engine(s), and when installed; battery, avionics and cabin.

- Increases engine life, reliability, and safety of operations.
- Reduces maintenance, torque oscillations, thermal stress, warm up, and launch times.
- System is self-regulating, does not operate in flight, and is not connected to or dependent on aircraft systems
- Heated components reach average state of thermal equilibrium in approximately six (6) hours.

5.1 Physical Attributes

Heat applied through electrical resistance elements in the form of thin pad elements sized to fit various engine parts, and gearboxes. Power routed through dedicated shore power plug and wire assembly with power indication and Circuit Protection Device (CPD).

Option - AV/Cabin Heater preconditions avionics and cabin with forced air PTC heater.

Option - Battery Heat Kit preconditions battery(s) with ambient temperature controlled external element.

6. CONTROL AND OPERATION

Operating instructions contained in Operating Guide TPG0004, or as recorded in Table 1.

- Plugging and unplugging power to the system controls operation.
- Do not fuel the aircraft with the preheat system plugged in. Only operate with effected component fluids at operational levels.
- System can be operated immediately, as soon as practicable, after full engine shut down.
- Heated components reach thermal equilibrium in approximately six (6) hours
- When operating at temperatures with a wind chill of -12°C / +10°F and below use of engine cowl plugs and insulated cover is recommended. In extreme conditions insulated spinner and propeller covers may be required. Cowl plugs and insulated covers increase efficiency by insulating and acting as windbreak.
- Shore power plug (inlet) is placarded. Plug, is commonly accessible through engine cowl/nacelle opening or door, located on engine mount, oil filler-tube. Airframe eligible kits may incorporate door kit and dedicated plug(s) located in engine nacelle pylon/strut or on pilot side of airframe (Figures 1, 4, and 5).

7. REMOVAL AND REPLACEMENT

Should heat element, engine, or part with element, require removal for replacement or repair, remove heat element(s) and appropriately cap off and secure associated wiring, or completely remove kit from engine. Placard inoperative IAW applicable regulations if eligible, or defer IAW approved MEL/NEF, if applicable.

- Should maintenance be required: Reference associated component documents recorded in Table 1. Before returning to service perform Visual Inspection and Functional System Check, §§ 4.1 and 4.2.
- Transferring STC approved kits requires written consent, contact Tanis Aircraft Products.

8. SERVICING INFORMATION

⚠ Caution: DISCONNECT FROM POWER before preforming any service, including fuse replacement or resting of breaker. After service, before connecting to power, preform Functional System Check, § 4.2.

There are no “life limited” parts in the preheat system. Part life is based on condition per inspection. Components shall be repaired or replaced upon failure or damage.

- Cleaning - In accordance with engine and airframe manufacturer’s recommendations.
- For guidance to other service information and troubleshooting, reference § 4, 7, and 15.
- Before installing any element inspect overall condition and check for proper resistance with calibrated ohmmeter. Electrical Values recorded in Table 2, and applicable Preheat Kit Installation Instruction, recorded in Table 1.
- Heat Elements are not to be connected to power until installed and sealant has cured.
- Fuse replacement: TU02848, 12-Amp 1.25 x 0.25 ceramic tube fuse.
  Acceptable alternates: Bussmann ABC-12, AGC-12, or equivalent.
- Plug circuit load is not to exceed 80% of CPD.
- CPD is not to exceed 12 Amps.

9. LIST OF SPECIAL TOOLS

Required:

Ohmmeter certified to traceable standard.

Suggested tools for installations and repairs:

- Wire cutter/stripper.
- Deutsch contact remover tool: DT-RT1 or equivalent.
- Tanis 4-way indent crimp tool: TU02793 - Alternate DMC: AF8-TH163 or equivalent.

10. DATA

Supporting documents recorded in Table 1.

Electrical values recorded in Table 2.

Troubleshooting Guide in Table 3.

11. SPECIAL INSPECTION REQUIREMENTS

In addition to special inspection events, as defined by aircraft maintenance manual and this ICA, inspect in the event of a hard landing, lightning strike, or water immersion.

For global standardization and safety of operations, power connection point (shore power plug), is a non-locking blade type NEMA connector (Figures 1, 2, 4, and 5). 230-volt systems supplied with power outlet (plug receptacle, TP02829-230) for field installation on extension cord supplied by operator reference instruction, TN02829.

12. RECOMMENDED OVERHAUL INTERVALS

No recommended overhaul intervals exist for this system, reference, §§ 4 and 7.

13. FOR COMMUTER CATEGORY AIRCRAFT

No changes are required.

14. APPLICATION OF PROTECTIVE TREATMENTS

No protective treatments required.

15. TROUBLESHOOTING

⚠ Initial troubleshooting performed with system disconnected from power source.

Troubleshooting Guide, reference § 16, Table 3.

- Elements and system circuit(s) visually inspected and tested using calibrated ohmmeter, reference §§ 4 and 9.
- Values for system and individual elements can be checked and verified without power by measuring ohms of resistance and using ohm law.
- Voltage squared, divided by Resistance = Wattage ($V^2/R=W$).
- Voltage squared, divided by Wattage = Resistance ($V^2/W=R$).
- System wattage, measure resistance between plug contacts 1 and 2 (Figure 1) ($V^2/R=W$).
- Element wattage, measure resistance between contacts ($V^2/R=W$).
- Element part number used to calculate ohms, last numbers after dash call out voltage/wattage ($V^2/W=R$).

16. TABLES AND FIGURES

Table 1. Supporting Documents

Installation, Maintenance, and Operating documents (recorded at installation).

Reference applicable Preheat Installation Instruction, Table 1 for complete listing.

Document	Rev	Description
		Drawing - Preheat Kit Item List
		Drawing - Cable Kit Wire Diagram
		Instruction - Preheat Installation
TN02793		Instruction - Connector
		Instruction - Bonding
TPG0004		Operating Guide
TN02829		Instruction - Receptacle (Adapter plug 230-volt kits)

Table 2. Electrical Values

Installed system and elements values (recorded at installation) transferred from installation documents and verified as required.

System: Volts:_____ Amps:_____ Watts:_____ Ohms:_____

Part Number	Description	Wattage	Ohms
(TEP3181-115/120)	(Pad Element)	(120)	(110.2)
	Total wattage:		

Table 3. Troubleshooting Guide

SYMPTOM	PROBABLE CAUSE	MAINTENANCE ACTION
System does not heat.	Circuit protection tripped or blown fuse.	Disconnect power, reset breaker or replace fuse, before reconnecting to power preform Functional System Check.
	Ground shore power cord not providing power.	Verify power source output and cord continuity. Connect cord and check cord outlet for proper voltage output.
	Wire broken to junction.	Disconnect power, preform Functional System Check and as required check circuits with ohm meter before connecting to power.
	Shore power plug damaged.	Repair and/or replace plug.
Power indicator light doesn't light when attached to shore power.	Circuit protection "blown".	Reset breaker or replace fuse.
	Voltage out of range.	Connect to appropriate power source.
System heats some, not all elements heating properly.	Defective element(s).	Check element with Ohmmeter.
	Voltage too far out of range.	Connect to better power source.
	Wire broken.	Check connections and wire to element.
Smoke or odor occurs on newly installed pad element(s).	Off gassing occurs normally from new elements.	Check system for proper installation and voltage.
Smoke or odor occurs on system that has been installed for at least a month.	Heat element failing. (yellow/gray areas appearing on pad)	Disconnect power. Remove and replace heat element, check rest of system for proper installation.
	Heat element dirty/oily.	Disconnect from power and clean element.
Circuit protection or GFI for ground shore power supply trips.	Damaged system or extension cord.	Check extension cord and system for damage, short, or water damage.

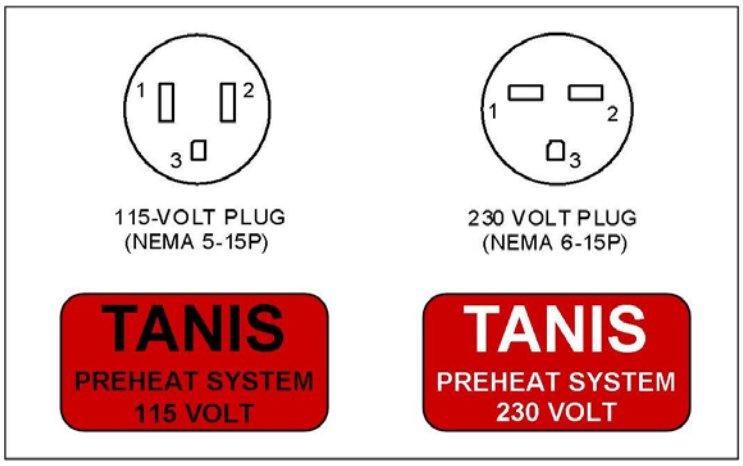

Figure 1. Shore power plug types and placards. Standard Tanis placard shown, appropriate alternate stating *Tanis System* and required voltage acceptable.

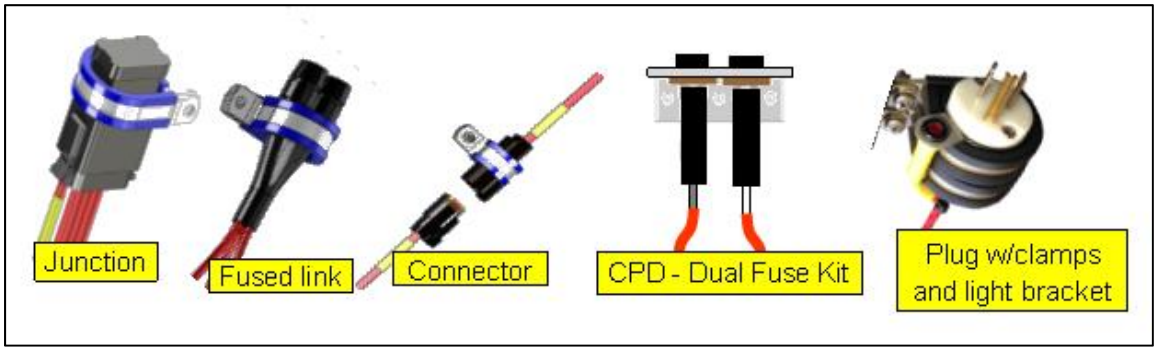

Figure 2. Examples of clamp positions on various components.

Figure 3. Example of generic pad heat element.

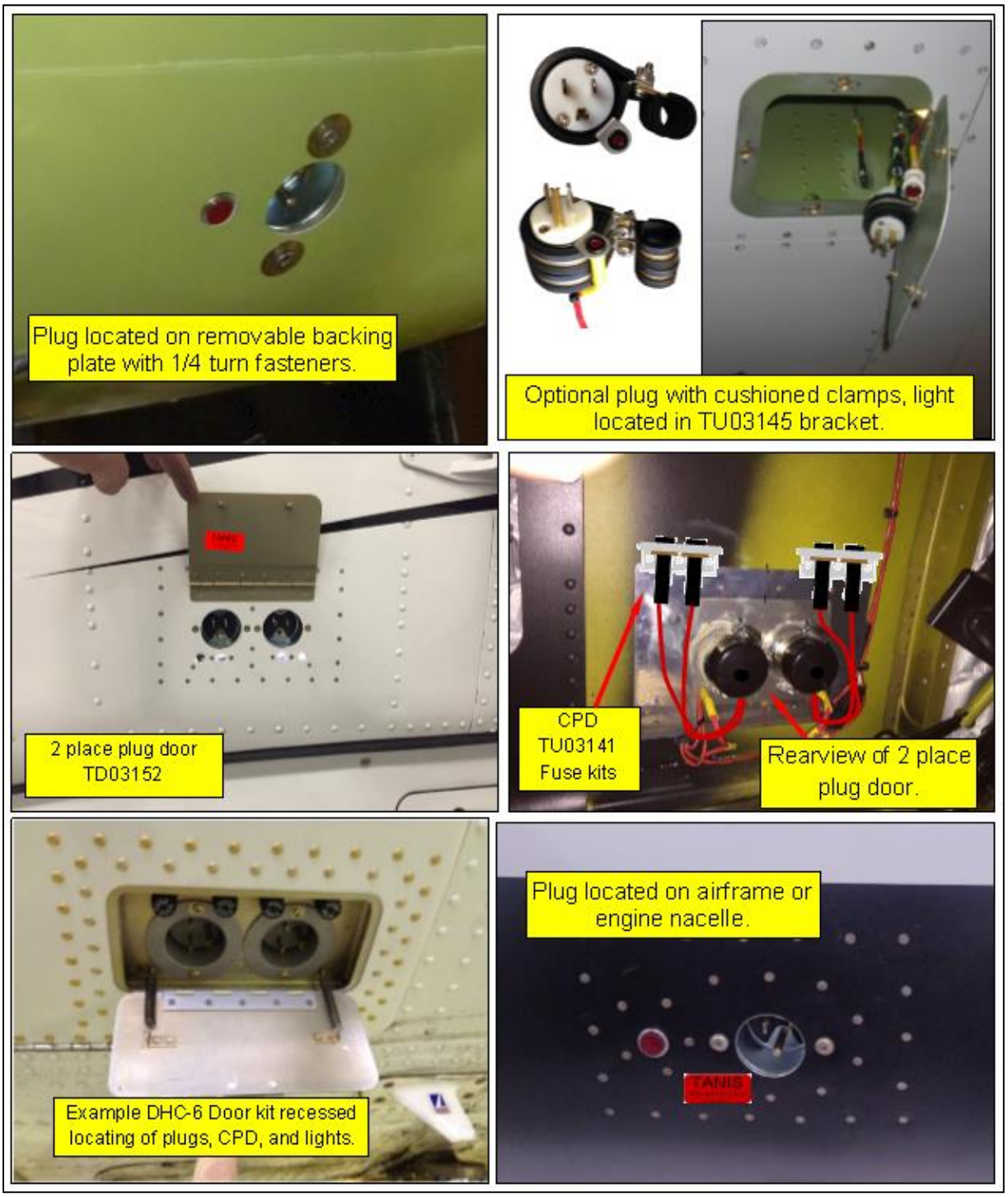

Figure 4. Examples of shore power plugs, actual configuration may vary from depictions. Shore power plug shall be securely located. Cushioned clamps or optional plug bracket are suggested if not using door, bracket and/or flush plug.

Figure 5. Additional examples of shore power plugs located on airframes.

******* NOTHING FOLLOWS *******