TANIS
AIRCRAFT PRODUCTS

INSTRUCTIONS FOR CONTINUED AIRWORTHINESS

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Revision: C
Dated: SEP-09-2014

FOR

PISTON ENGINE PREHEAT SYSTEMS

Registration No._____ Serial No._____

This supplement must be attached to the applicable Approved Maintenance Manual when the Tanis Preheat System is installed. Information in this manual supplements or supersedes the basic manual only in those areas listed.

(Supporting information to be recorded at time of installation in Tables pages 6 and 7)

RECORD OF REVISIONS

When updated, this document is changed in its entirety.

REV	DATE	DESCRIPTION	BY	RELEASE
C	SEP-09-2014	Define power connection in Section 5.	DNE	Digitally signed by Dirk Ellis DN: cn=Dirk Ellis, o=Tanis Aircraft products, ou, email=Dirk@tanisaircraft.com, c=US
B	MAY-23-2014	Reformat, add Tables and Figures.	DNE	DNE
A	AUG-24-2010	Previous revisions date controlled	GDO	DNE

DOCUMENTATION SUPPORT

It is the responsibility of the user of this, and other document, to verify the latest revision is being used. Revision updates may be obtained by contacting:

Tanis Aircraft Products - 952-224-4425 - www.TanisAircraft.com.

CONTENTS

1. PURPOSE

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

2. AIRWORTHINESS LIMITATIONS

This system does not change Airworthiness Limitations. The FAA Airworthiness Limitations section specifies inspections and other maintenance required under 14 CFR 43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

3. RECORD OF REVISIONS

It is the responsibility of the user of this document to verify the latest revision is being used, and that installation documents associated with the installation of the kit are maintained and recorded in Table 1 of this document. Revision updates and additional copies may be obtained by contacting: Tanis Aircraft Products - 952-224-4425 - www.TanisAircraft.com.

When the latest update is received, the previous revision in its entirety should be discarded. Check to see that all pages of the document are marked as the latest revision, and required information is recorded as indicated.

4. DESCRIPTION

Engine preheating is accomplished through electrical resistance heat. Elements are located in each cylinder assembly, on the engine crankcase and oil sump/tank. Power is routed to the elements through a dedicated wiring assembly with system power indication, and circuit overload protection. System is self-regulating through design. Heated components reach an average state of thermal equilibrium in approximately six hours.

The shore power plug (power connection point) is placarded, and mounted on or near the engine oil filler-tube, engine mount, or in a location accessible through a cowl opening or door (Figures 1, 2, and 3).

Total operational load is not to exceed 12 amps. For a complete listing of supporting documents containing detailed description of kit components reference Section 16, Table 1.

5. CONTROL AND OPERATION

Operating instructions are contained in the Operating Guide listed in Section 16, Table 1.

Connecting (plugging) the system into ground power controls operation.

Do not fuel or operate the aircraft with the preheat system connected/plugged in. Only operate with effected component fluids at operational levels.

The system can be operated immediately after full engine shut down. To be of maximum benefit at temperatures below 0°C / 32°F, it should be in continual use for a minimum of 6 hours before engine start.

When operating at temperatures with a wind chill of -12°C / +10°F and below, the use of an insulated cowl/engine cover is suggested, and in extreme conditions insulated spinner and propeller covers may be required. Covers increase efficiency by insulating and acting as windbreak.

6. REMOVAL AND REPLACEMENT

Should an element, engine, or part with an element installed require removal, remove the heat element(s) and appropriately cap off and secure associated wiring, or completely remove the kit from the engine. Placard preheat system inoperative IAW (In Accordance With) applicable regulations if eligible, or defer, IAW approved MEL/NEF (Minimum Equipment List / Nonessential Equipment Furnishings) if applicable.

Transfer of an STC to a replacement engine requires the written consent of Tanis Aircraft Products.

For detailed preheat kit, individual parts installation and replacement information, reference Table 1.

7. SERVICING INFORMATION

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

Before reinstalling an element that has been removed, inspect overall condition and measure resistance with calibrated ohmmeter and compare reading to values listed in Table 2.

Inspect pad element for signs of oil damage, abrasion or exposed heating wire. Replace elements showing signs of damage or exposed wires.

Inspect threaded elements using a flashlight and 10x magnifier. Visually inspect threaded shank area for distortions or evidence of cracking. Replace elements with signs of fractures. When installing elements torque to factory specifications for location of installation. Refer to the most recent applicable Aircraft Maintenance Manual and threaded element installation instruction.

Before applying power reconnect all system components and perform Functional System Check Section 15.

8. MAINTENANCE AND INSPECTION

⚠ Caution: Energized elements can cause second-degree burns.

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. Maintenance is to be recorded as per 14 CFR Part 43.9, unless an alternative program has been approved. Repairs are to conform to applicable standards, reference 43.13 1-b, 11. Visual and operational check is to be conducted by an appropriately rated and certified technician or maintenance/repair facility.

8.1. Cleaning is to be performed in accordance with engine/airframe, engine manufacturer’s recommendations.

8.2. Inspections intervals are to be performed at each annual or equivalently scheduled inspection. Minimum of one (1) check per 12-month cycle/annually is required. In addition, it is recommended that the system operational status be checked seasonally.

8.3. Inspect for security of attachment by following cable leads from the shore power plug to each element. Inspect connectors and junctions for signs of heat damage or deformities. Inspect wire/cable for signs of fatigue, chafing, flexing, heat damage, and vibration, re-secure and or repair as needed. Reference AC 43.13-1b, Chapter 11 Sections 1, 3, 4, and 8, and Cable Kit - Wire Diagram, for additional electrical inspection and repair information.

8.4. Inspect pad heat elements for security of attachment and bonding. Should any portion of the pad heat element come loose it may be re-bonded or replaced. Replace pad element developing areas of gray/yellow. These are signs indicating that a pad has failed, or is in the process of failing due to poor contact with the substrate. Perform replacement and/or repairs as required, refer to Bonding Instructions as needed.

8.5. Inspect threaded elements for security of installation. Inspect wire to element transition point, where the lead enters the element body, for signs of heat damage or broken wires, and inspect the connector for security of attachment and deformities. Perform replacement and/or repairs as required.

8.6. Once inspection has been completed, perform a Functional System Check, Section 15.

9. LIST OF SPECIAL TOOLS

Required:

- Ohmmeter certified to traceable standard is required for inspection and troubleshooting.

Suggested tools for system repairs include:

- TU02905-05 1/2-inch Slotted Socket (or equivalent).
- TU03032, 11mm Slotted Socket (required for limited number of metric kits).
- Flashlight and 10x magnifier.
- Deutsch contact remover tool: DT-RT1.
- Tanis 4 way indent crimp tool: TU02793.
  - Alternate crimp tool, DMC: AF8-TH163.

10. DATA

Supporting documents listed in Table 1, electrical values Table 2

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.

12. RECOMMENDED OVERHAUL INTERVALS

No recommended overhaul intervals exist for this system.

13. FOR COMMUTER CATEGORY AIRCRAFT

No changes are required.

14. APPLICATION OF PROTECTIVE TREATMENTS

No protective treatments required.

15. FUNCTIONAL SYSTEM CHECK - TROUBLESHOOTING

⚠ Caution: Energized elements can cause second-degree burns.
Before proceeding, verify system is **not** powered or connected to a power source.
Verify that all elements are properly connected and bonding sealant is cured.
Follow in sequence, record as indicated, and check off when completed.
If a discrepancy is found, correct before proceeding to the next step.

Detailed installation and operation documents listed in Table 1.

For assistance in correcting discrepancy, refer to Troubleshooting table listed in Table 3.

[√] Check the system as follows:

1) [ ] Verify system is installed in accordance with preheat installation instructions.
2) [ ] Verify engine to airframe bonding is as per OEM requirements.
3) [ ] Verify Tanis system ground by checking for continuity between shore power plug ground, pin 3 (Figure 1), engine, and airframe.
4) [ ] Using an ohmmeter, verify there is no continuity between shore power plug power pins 1 and 2, and the ground pin 3.
5) [ ] Calculate total system wattage by adding up the wattages for each individual element. See Table 2 for common elements. Total system wattage: _____.
6) [ ] Using an ohmmeter, measure and record resistance between plug pins 1 and 2. Specific total system resistance: _____.
7) [ ] Calculate wattage from observed system resistance and compare to wattage found in step 5. (Volts^2 / Resistance = Watts) The values should be within +/- 10% of each other.
8) [ ] Connect the system to appropriate power source.
9) [ ] In about 30-minutes the area next to the elements should feel warm. Check each element individually.

16. TABLES AND FIGURES

TABLE 1 - Supporting Documents
Complete by recording associated preheat installation documents.

	Engine Preheat Kit - Item List
	Instruction - Preheat Installation
	Cable Kit - Wire Diagram
	Instruction - Threaded Element
TN02793	Instruction - Connector
TN02788	Instruction - Bonding
TPG0001	Operating Guide - Preheat System

TABLE 2 - Common element listings and conversion narrative. Values +/- 10%.

Element combinations vary. Refer to kit installation instruction recorded in Table 1, and Description, Section 4. Record installed values below and in Operating Guide.

To calculate the specific wattage of an individual element or installed system, measure total resistance between the contacts (Figure 1, 1 and 2), and use the following formula.
Voltage squared, divided by Resistance = Wattage ($V^2/R=W$).

To calculate resistance value of an element using the part numbers the digits after the dash (-) callout voltage and the numbers after the slash (/) callout wattage.

Voltage squared, divided by Wattage = Resistance ($V^2/W=R$).

System: Volt :_____ Amps:_____ Watts:_____ Ohms:_____
(Recorded at time of installation)

Elements:
(Record installed elements, reference kit installation instructions recorded in Table 1)

Part Number	Description / Location	Wattage	Ohms
(TEP2650-115/120)	(Pad Element / sump)	(120)	(110.2)
	Total wattage:		

TABLE 3 - Troubleshooting

Individual elements are tested disconnected from the system, measuring resistance across the element contacts; values listed in preheat installation instruction, and Table 2. For further assistance, contact Tanis Aircraft Products.

SYMPTOM	PROBABLE CAUSE	MAINTENANCE ACTION
System does not heat.	Circuit protection “blown fuse”.	Replace fuse(s) near plug.
	Ground shore power cord not providing power.	Connect cord, and power at source (wall).
	Wire broken to junction.	Check connections and wire junction.
	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 Ohm meter.
	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 system.	Off gassing occurs normally from new elements.	Check system for proper install 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.

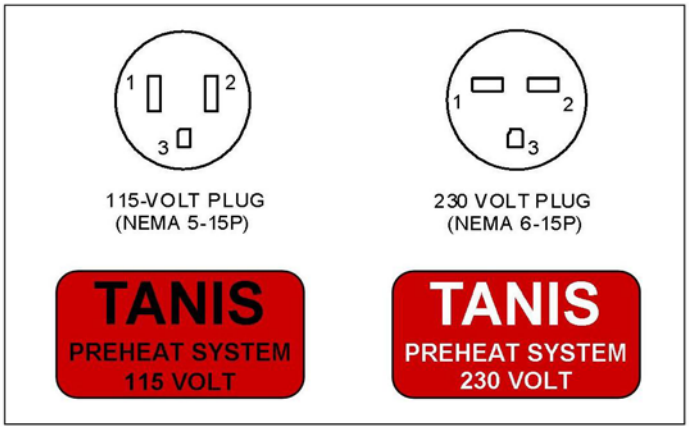

Figure 1 Shore power plug types and placards. Standard Tanis placard shown, appropriate alternate stating *Tanis System* and required voltage acceptable.

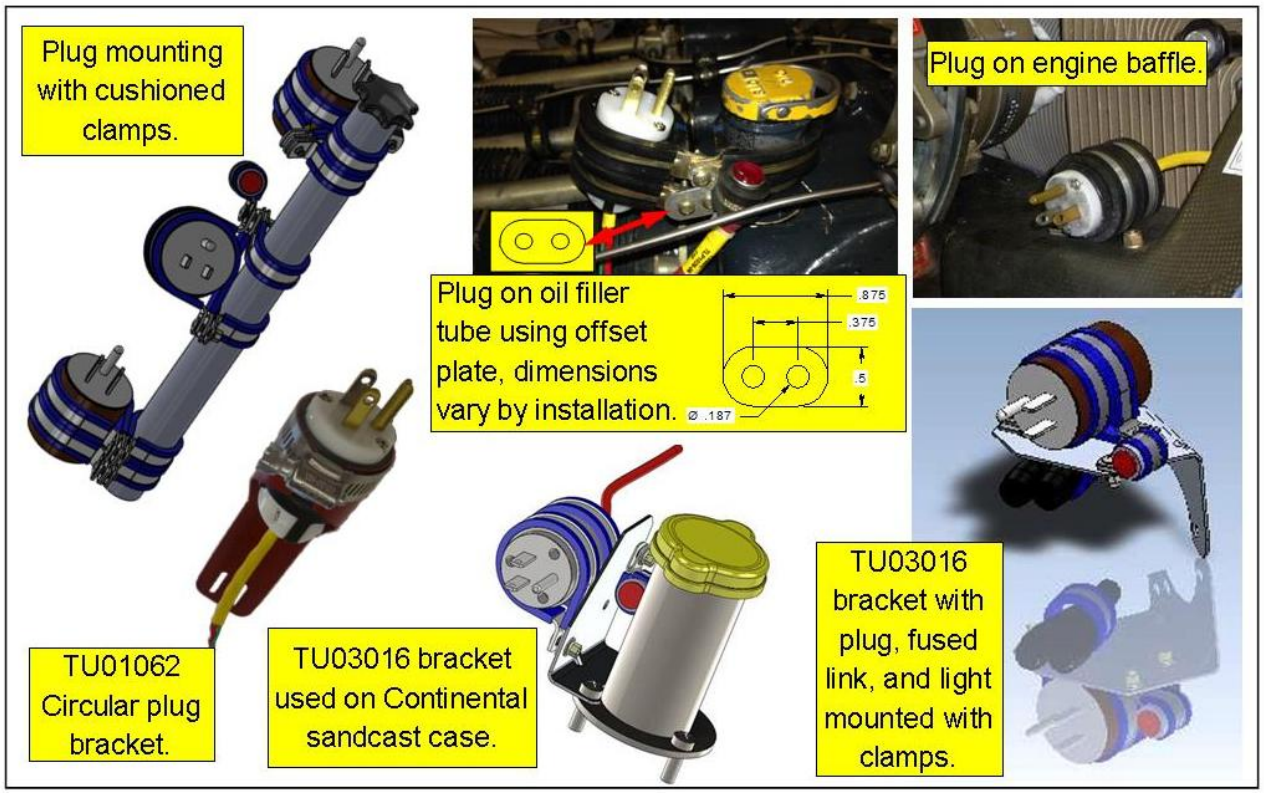

Figure 2 Shore power plug mounting options show, actual configuration may vary from depictions. Circular plug and indicator light must be secured. Cushioned clamps or optional plug bracket are suggested if not using flush mounted plug.

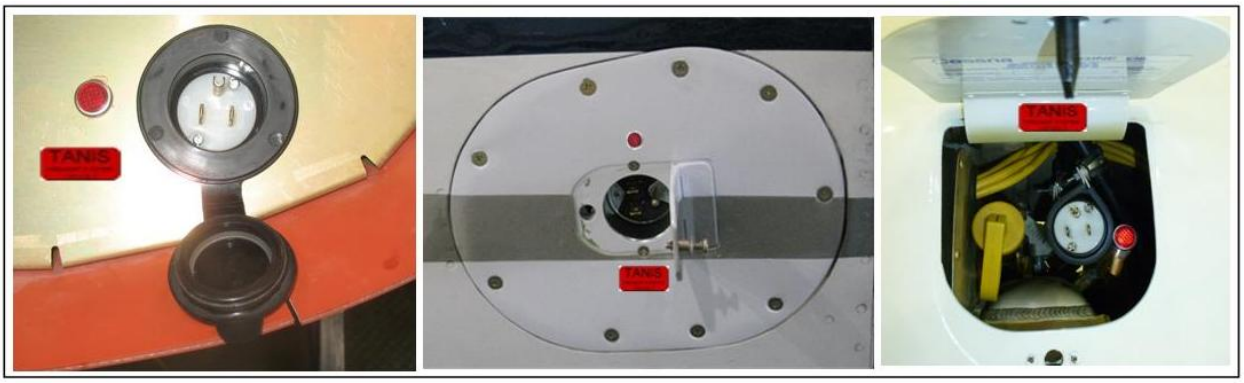

Figure 3 Common plug configurations. Left to right, flush plug with tethered cap and indicator light in engine baffle, flush plug and door in cowl or on airframe, and plug shown accessible though oil filler door, mounted on or near oil filler.

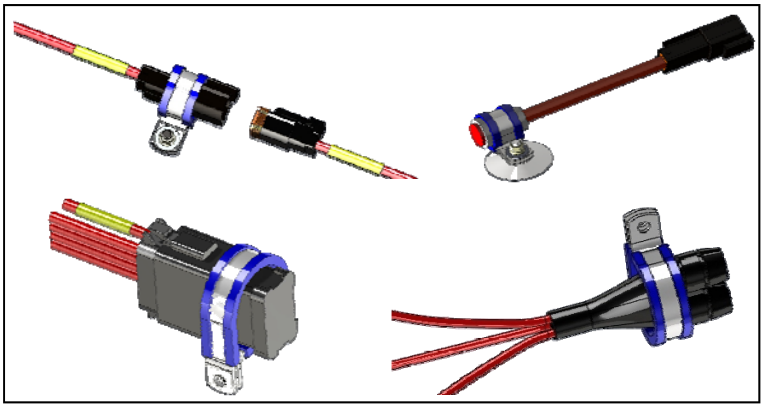

Figure 4 Mounting options and clamp positions shown for connectors, indicator light, junction, and dual fused link.

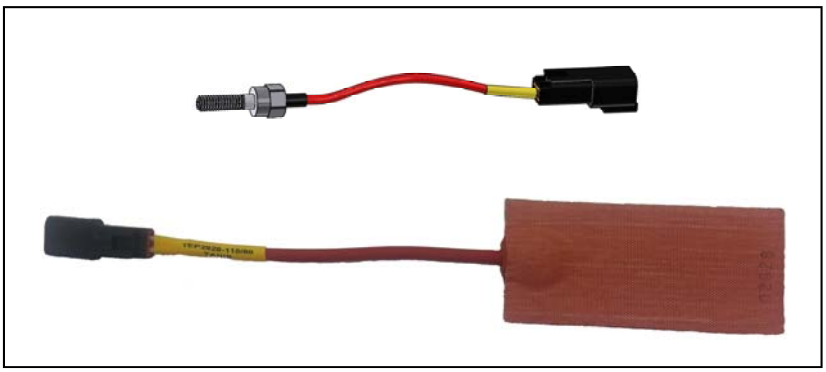

Figure 5 Example of threaded and pad heat elements.
Threaded elements are installed in each cylinder assembly using engine manufacturer's torque values for location of installation.
Pad elements are installed on the engine case and oil sump/tank.

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