TANIS
AIRCRAFT PRODUCTS

INSTRUCTIONS FOR CONTINUED AIRWORTHINESS

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Dated: SEP-01-2015

FOR

ROTORCRAFT 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 in Tables of Section 16)

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RECORD OF REVISIONS

When updated, this document is changed in its entirety.

REV	DATE	DESCRIPTION	BY	RELEASE
D	SEP-01-2015	Update battery heat reference § 14 and 15	DNE	Dirk N. Ellis
C	JUN-26-2014	Reformat, add Tables and Figures.	GDO	DNE
B	MAY-16-2011	Previous revisions date controlled	DNE	RCK
A	SEP-14-2010	Initial Release	GDO	RCK

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 this rotorcraft, 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 Airworthiness Limitations section of the FAA specifies inspections and other maintenance required under §§ 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. Verify all pages of the document are marked as the latest revision, and Tables are updated accordingly.

4. DESCRIPTION

Installed kit configurations vary depending on engine type (piston or turbine). For installed system descriptions, consult installation instruction recorded in Table 1.

Preheat is supplied through electrical resistance elements in the form of thin pads sized to fit engine(s), main and tail rotor gearboxes, fluid reservoirs/tanks, and battery (when battery kit is installed). Power is routed to the elements through a dedicated wiring assembly with circuit overload protection, power indicator light, and accommodations for battery heat kit. System is self-regulating.

Additionally, smaller helicopters powered with internal combustion piston engines, are heated with a combination of threaded and pad elements, commonly incorporate a removable jumper lead to connect tail rotor element. . When a jumper cable is used, it is to be flagged with a **"Remove Before Flight"** streamer. This lead is only connected during preheat, and is disconnected and stowed before engine start-up. Refer to preheat installation instructions and cable kit - wire diagram, and operating instructions, recorded in Table 1

The shore power plug (power connection point) is placarded, and mounted on the airframe in a accessible location (Figures 2 and 3).

Heated components reach an average state of thermal equilibrium in approximately six hours. Total operational load is not to exceed 12 amps

Table 1 contains listing of supporting document. Per installation, record additional supporting documents as indicated.

For global standardization, systems power connection point (shore power plug), is configured with a non-locking blade type NEMA connector, reference Figure 1. Corresponding receptacle connector is required on power supply (extension cord), and are commonly supplied with the 230-volt kits. Approved receptacles are available though Tanis (TP02872-115, TP02829-230).

5. CONTROL AND OPERATION

Operating instructions are contained in the Operating Guide listed in Table 1.

Plugging in and unplugging the system controls operation.

Do not fuel the aircraft or run engines, with the preheat system 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 insulated covers is suggested. Insulated covers increase efficiency by insulating and acting as windbreak.

6. REMOVAL AND REPLACEMENT

Should a gearbox, engine, or other part, with a heat element require removal for any reason, cap off, and secure cabling.

For detailed 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. Before returning to service, reconnect all system components and perform Functional System Check Section 15.

For guidance to other service information, see Sections 6 and 8.

For fuse replacement, disconnect system from power and replace fuses. For direct replacement use Tanis part number TU02848, 12-Amp 1.25x.25 ceramic tube fuse. Acceptable alternates are Bussmann ABC-12 or AGC-12.

8. MAINTENANCE AND INSPECTION

⚠ Caution: Energized elements can burn bare skin.

Supporting documents listed in Table 1.

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 under 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. Recommend operational status check prior to winter season.

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 routing and termination.

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.

8.7. Additional information on battery heat portion of the system available in Battery Heat System ICA TICA2800 and Battery Installation Instruction TN02800.

9. LIST OF SPECIAL TOOLS

Required: Ohmmeter certified to traceable standard for inspection and troubleshooting. Additionally, systems with threaded elements require calibrated torque wrench, and slotted socket; TU02905-05 1/2-inch or TU03032, 11mm (required for limited number of metric kits), or equivalent.

Suggested tools for system repairs include:

- 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.

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

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: Contact with hot element can cause 2nd degree burns.

Before proceeding, verify that 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.

* Skip when not installed, or test separately.

[√] Check the system as follows:

1) [ ] Verify system components are installed in accordance with kit installation instructions.
2) [ ] Verify effected component fluid levels are at operational levels.
3) [ ] Verify engine to airframe/engine bonding (ground strap) is as per OEM requirements.
4) [ ] Verify preheat system ground by checking for continuity between shore power plug ground, pin 3 (Figure 1), engine, and airframe.
5) [ ] Verify there is no continuity between shore power plug pins 1 and 2, and the ground pin 3.
6) [ ] Using an ohmmeter, measure resistance between the power pins 1 and 2, and record total system resistance: _____. Compare with Table 3.
7) [ ] * Freeze (0°C) battery thermal control and repeat step 6, record: _____.
8) [ ] Connect the system to appropriate power.
9) [ ] Verify power indicator light is on (illuminated).
10) [ ] Within 30-minutes, area adjacent to the elements will start to feel warm. Check each element individually.
11) [ ] * While system is warming up, freeze (0°C) battery thermal control, then test battery heat element for heat. Element can be touched, as wattage density is low.
12) [ ] When testing is completed, disconnect (unplug) from power, latch any access doors that were open, and stow extension cord in appropriate location.

16. TABLES AND FIGURES

TABLE 1 - Supporting Documents

Record in blanks associated Engine Preheat Kit installation documents.

	Engine Preheat Kit - Item List
	Instruction - Preheat Installation
	Cable Kit - Wire Diagram
	Operating Guide - Preheat System
TN02793	Instruction - Connector
TN02788	Instruction - Bonding
TN02800	Instruction – Battery Heat Installation
TICA2800	Battery ICA (additional maintenance and trouble shooting)

TABLE 2 – (To be completed at installation)

For installed System values refer to Preheat Kit Installation Instruction recorded in Table 1 of this document (attached) or record installed elements in Table 2 below. Installed values are to be recorded in installed system's Operating Guide.

To calculate the specific wattage of an individual element or installed system, measure total resistance between the contacts 1 and 2 (Figure 1) 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)

Common elements: (Values +/- 10%)

Pad Element Description	**Part Number**	**Wattage**	**Ohms**
(Pad Element)	(TEP2650-115/120)	(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".	Reset breaker or replace fuse.
	Ground shore power cord not providing power.	Connect cord and check 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.
Battery element does not heat.	Thermal Control faulty.	Check element resistance if good freeze Thermal Control and recheck, replace as required. Refer to Battery ICA.

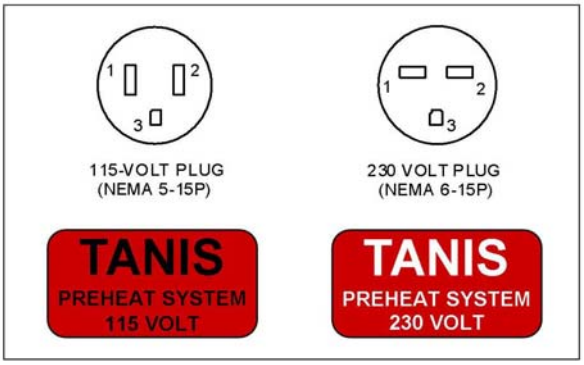

Figure 1 - Shore power plug types and placards. Standard Tanis placard shown, appropriate alternate stating *Tanis System* and required voltage acceptable.

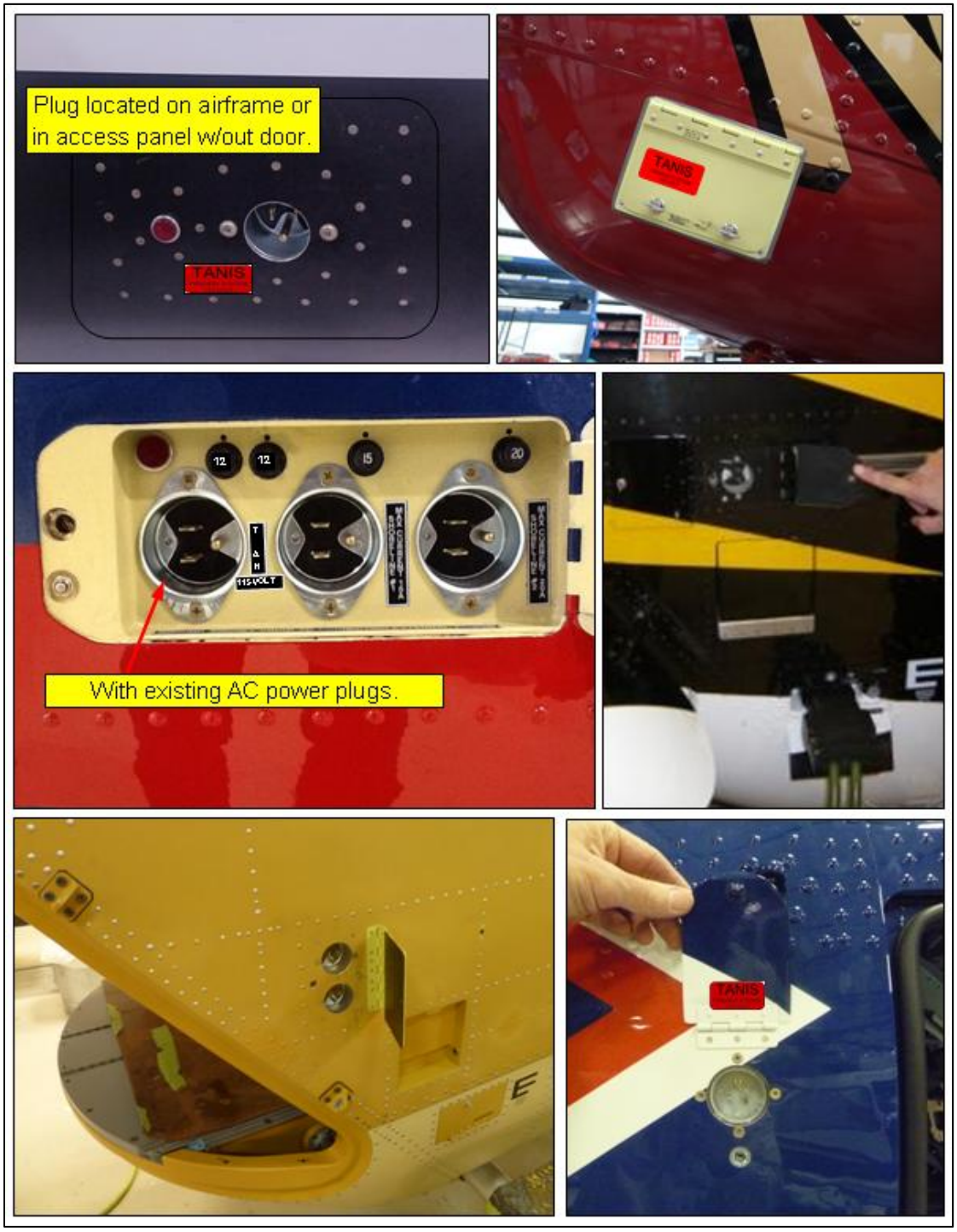

Figure 2 - Shore power plug, actual configuration may vary from depictions.

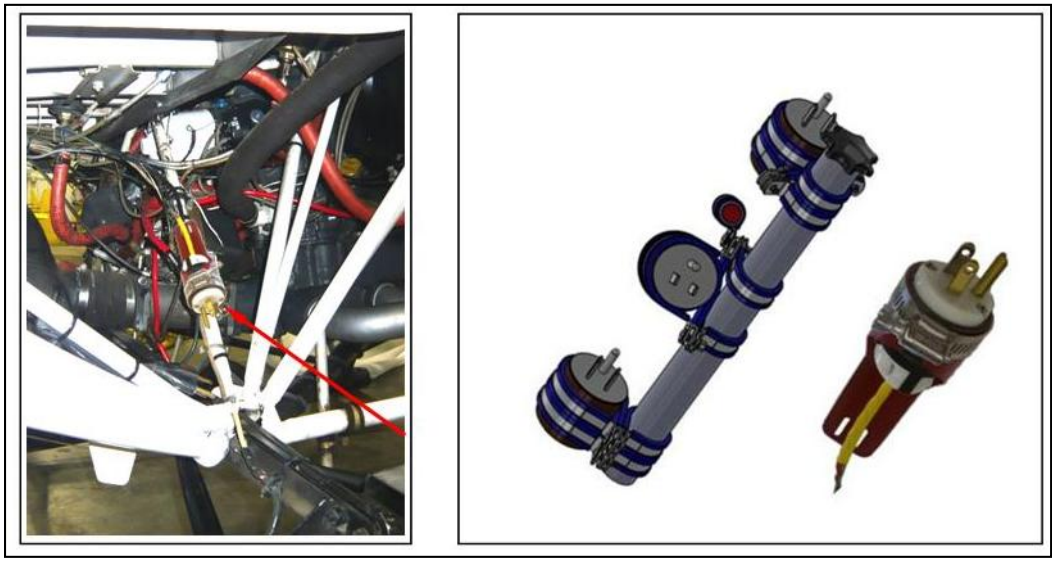

Figure 3 - Examples of plug mounting options: Left - TU01062 circular plug bracket. Right - Plug secured with cushioned clamps, and TU01062 bracket.

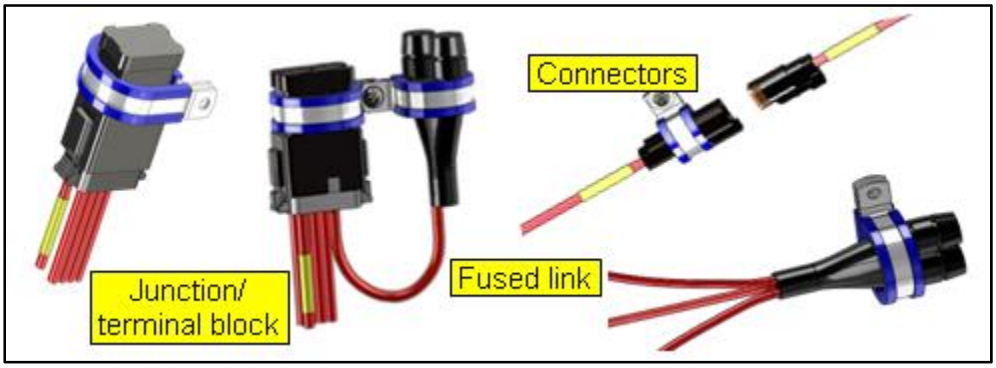

Figure 4 - Examples of clamp positions on cabling components.

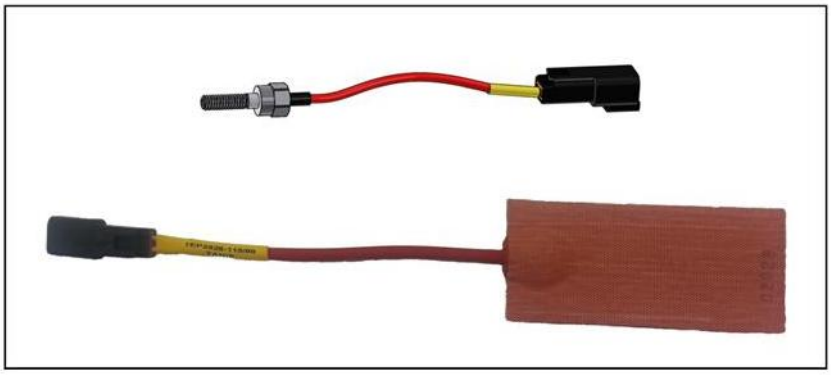

Figure 5 - Example of threaded and pad elements, size and shapes vary. For battery heat element depictions refer to battery installation and ICA documents listed in Table 1

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