



**COLD WEATHER MODIFICATION**

**INSTRUCTIONS FOR  
CONTINUED AIRWORTHINESS**

**Document No: TCA0006, Rev.: A**

**Dated: MAY-12-2015**

**FOR  
AUXILIARY POWER UNIT (APU)  
PREHEAT SYSTEM**

**(GTCP- Gas Turbine Compressor [air] Power unit [electrics])**

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 installation documents to be attached and recorded in Section 16)*

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## RECORD OF REVISIONS

*When updated, this document is changed in its entirety.*

REV	DATE	DESCRIPTION	BY	RELEASE
A	MAY-12-2015	Initial Release	DNE	

## DOCUMENTATION SUPPORT

It is the responsibility of the user to verify the latest document revisions are being used.  
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## **1. PURPOSE**

The purpose of this ICA is to aid the operator in creating an acceptable maintenance program for the APU/GTCP (Auxiliary Power Unit) Preheat System that complies with standard aviation processes and APU/Airframe 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](http://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 the cover page and Tables in Section 16 are updated accordingly.

## **4. DESCRIPTION**

Preheat is supplied through electrical resistance elements in the form of thin pads sized to fit reduction gearboxes and oil tank. Heated components reach an average state of thermal equilibrium in six hours, with a temperature rise of approximately  $33.33^{\circ}\text{C} \pm 5.56$  /  $60^{\circ}\text{F} \pm 10$ , over ambient air temperature. The preheat system is self-regulating by design; it is not to be cycled on and off, timers and thermostats are not to be used.

Power is routed to the heat elements through a dedicated wiring assembly with shore power plug (power connector) circuit protection (listed in Section F), and red power indicator light.

The power connection point (shore power plug) varies by installation. Common location for the plug is in an APU access panel or door, or hold, near the APU.

Listing of supporting documents recorded in Table 1.

## **5. CONTROL AND OPERATION**

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

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

The aircraft is not to be fueled and APU is not to be operated while the preheat system is in operation or connected with extension cord (plugged in).

System is not to be cycled on and off (timers and thermostats are not to be used).

## **6. REMOVAL AND REPLACEMENT**

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

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. 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 APU/airframe 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 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. 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:

- 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.

[ √ ] 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) [ ] Using an ohmmeter, 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 2.
- 7) [ ] Connect the system to appropriate power.
- 8) [ ] Verify power indicator light is on (illuminated).
- 9) [ ] Within 30-minutes, area adjacent to elements will start to feel warm. Check each element individually.

## 16. TABLES AND FIGURES

**TABLE 1** - Supporting Documents

Record in blanks, associated Engine Preheat Kit installation documents.

	APU Preheat Kit - Item List
	Instruction - Preheat Installation
	Cable Kit - Wire Diagram
TN02793	Instruction - Connector
TN02788	Instruction - Bonding
TPG0006	Operating Guide - Preheat System

**TABLE 2 – (To be completed at installation).**

Refer to kit installation instruction recorded in Table 1, and Description, Section 4. Record installed values below and in TPG0006 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:** \_\_\_\_\_

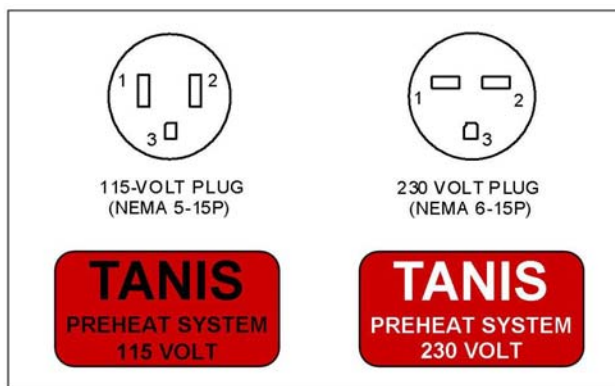
**Common elements: (Values +/- 10%)**

<b>Pad Element Description</b>	<b>Part Number</b>	<b>Wattage</b>	<b>Ohms</b>
(Pad Element)	(TEP2650-115/120)	(120)	(110.2)
Total wattage:			

**TABLE 3 - Troubleshooting**

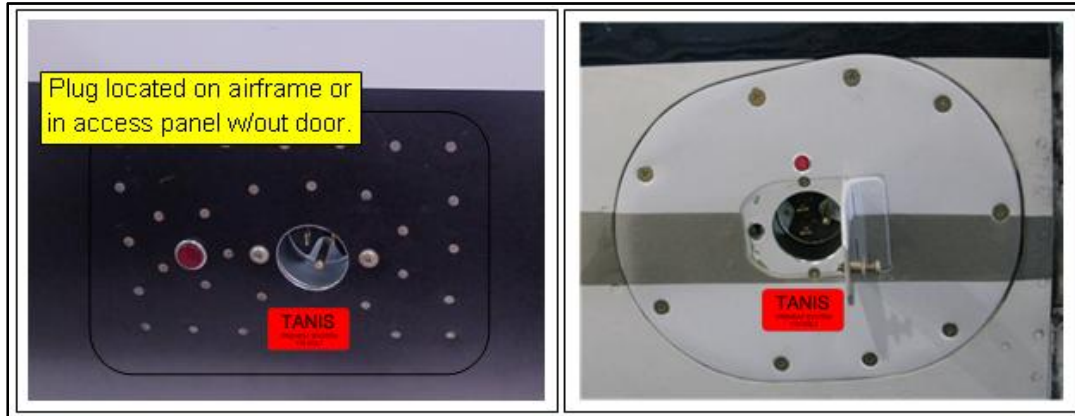
Individual elements are tested by measuring resistance across the element contacts; values are listed in preheat installation instruction, and Table 2. For further assistance, contact Tanis Aircraft Products.

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.

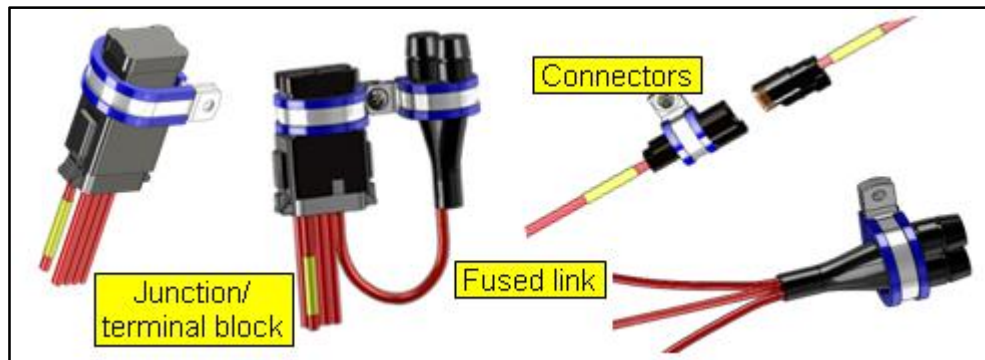


**Figure 1** - Shore power plug types and placards. Standard Tanis placard shown, appropriate alternate stating *Tanis System* and required voltage acceptable.





**Figure 2** - Examples of shore power plug and placard, locations vary by installation. Power may also be supplied through primary preheat system.



**Figure 3** - Examples of clamp positions on cabling components.



**Figure 4** - Generic example of pad heat element.

\*\*\*\*\* NOTHING FOLLOWS \*\*\*\*\*